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TREATISE  
ON  
THERAPEUTICS

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NINTH EDITION

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# THERAPEUTICS.

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## CHAPTER I.

### RECONSTITUENT REMEDIES.

#### IRON.

##### *Chlorosis.*

IN order to form a just idea of the action of the ferruginous drugs, it is necessary to consider the disturbances produced in the system by modifications in the crasis of the blood.

A number of disturbances occur after a full bleeding, no doubt owing to the fact that the organs no longer receive an amount sufficient for the discharge of their functions. In proportion as the loss of blood is repaired, these disturbances cease. But, if the bleedings are repeated so often that the blood cannot be renewed, if the supply of nutriment is not sufficiently rich to furnish materials for such renovation, or if a malady, unknown in its essence but very common, blanches the blood to an extent even greater than the most abundant bleeding will cause, a condition of the system supervenes which is known in women by the name of chlorosis, and in men is termed anæmia.

Chlorosis is almost always spontaneous. Anæmia is almost always secondary.

It is not easy to say why chlorosis is the almost exclusive property of women; but every one knows that it is extremely rare to find a young man chlorotic.

It has been supposed that this fact might be explained by the difference between the composition of the blood in the two sexes. Analysis proves that, in general, the blood of a healthy woman contains a little less of the globules than that of a man in good health. But, admitting that this difference is not without some influence, it is more rational to suppose that the real cause of this remarkable pathological fact resides in conditions inherent in the sex.

The analysis of MM. Andral and Gavarret demonstrate that in 1,000 grammes of normal blood we find, on an average, 127 grammes of blood-



globules; while in the case of chlorotic persons the amount may fall to 38, the quantity of fibrin remaining nearly the same as in women in health.

These analyses account for the pallor and the liquidity of the blood of chlorotic patients, and perhaps for the greater part of the singular symptoms of which they complain. One can see how the blood, robbed of a part of its stimulant principles, ceases to be fit to modify the organs, and that numerous functional troubles are the result.

The muscles of animal life lose color, become atrophied and relaxed; hence arises difficulty and slowness of motion. The muscles of organic life share in the same changes; hence, flaccidity of the heart, difficult circulation, sluggishness of the stomach, constipation, flatulence. Finally, the blood which reaches the nervous centres, the glands, and the membranes, no longer possessing its natural qualities, these organs can no longer exercise their functions as in their natural state.

If, then, we were to restore to the blood the principal elements which it lacked, we should make it again capable of exerting its regular influence upon the economy. This end is attained by Iron.

How does iron act in chlorosis?

Upon this point there are two very distinct opinions.

The majority at the present day believe that iron, when absorbed, passes directly into the blood, is there precipitated in the form of oxide, restores to it immediately the principles which are wanting, and makes the blood a reparative fluid at once.

Others attribute to this remedy a purely tonic action, in virtue of which the digestive and nervous functions are so influenced as to make innervation and nutrition more perfect—the organic restoration taking place indirectly, by means of this tonic action.

In support of this opinion we are able to quote the authority of Claude Bernard (*“Leçons faites au Collège de France,”* published in the *Union médicale*, 1854).

“The real question,” says this eminent physiologist, “is not, whether iron cures chlorosis, but, in the first place, whether chlorosis is due to the absence of iron, and if iron given as a medicine will fill the place of that which is wanting.

“Certain authors have claimed that the proportion of iron in the blood of chlorotic persons was lessened, but they have not proved the fact chemically. Those, on the contrary, who have made the analysis, have found that the amount of iron was the same in chlorosis as in other cases. It is true that in this disease the amount of globules is diminished.

“Let us suppose—as is probable—that there are about 6 grammes of iron in the mass of the blood, and that in chlorosis the blood loses 3 grammes. If all the iron which is given were absorbed, we should soon see the blood regaining this amount; but we know that it requires at least a month, and often much longer, to cure the disease, in spite of the masses of iron which are swallowed.”



Another difficulty here meets us: we cannot positively prove the absorption of iron in the stomach or intestines. Bernard injected iron-salts—the lactate, etc.—into the stomach, but was never able to discover in the blood of the portal vein a larger quantity than is usual.

“But,” continues Bernard, “since iron exists in the food, a certain combination may be required in order to effect absorption.”

There is, however, one fact which is positive and perfectly demonstrated: the salts of iron (adds Bernard) exercise a special action upon the gastric mucous membrane. Every portion of the membrane which is touched by them assumes a more active circulation. Iron, therefore, is a direct excitant.

In conclusion, Bernard puts this question:

“May not chlorosis be due to a faulty digestion? May not iron re-establish these disturbed functions by the excitation it produces?”

It is possible that Bernard has not said the last word upon this question. But we see that the data furnished by chemistry are far from satisfying him; and, if he has not yet solved this grave difficulty, he at least has the merit of placing us on the road to its solution.

Two points remain to be settled: on the one hand, the conditions which favor the absorption of a certain quantity of iron by the stomach are to be determined, for such absorption seems to us unquestionable, though it be not fully demonstrated by chemistry; on the other hand, the mysterious combination must be ascertained, which enables the minute and imperceptible absorption to take place. And finally, we must discover the secret of the mechanism by which the atoms of iron, drifting through the circulation, revivify the impoverished and altered globules, and build up the body:

The facts, or such as seem best demonstrated at present, are as follows: 1. The blood of chlorotic women contains less of the globules than is the case in well women. 2. Under the use of the chalybeates, the blood usually recovers quickly the cruor and the globules which it had lost. 3. Iron given to chlorotic patients seems to have two methods of action, distinct, but equally necessary. For, firstly, it acts as a tonic and direct excitant of the stomach, or (if we prefer the expression) as a special modifier of the peptic sense; and secondly, a part of the iron is very probably dissolved in the gastric juice and absorbed, coming directly in contact with the inner coats of the vessels; while, by virtue of an action which we call dynamic or vital, without attempting to examine or to define it, the medicine by slow degrees places the impaired functions of hæmatisis\* upon a normal footing. It is the combination of these two actions that reconstructs the blood-globules, and finally cures chlorosis. Such, in our opin-

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\* We refer especially to that action of vital chemistry which takes place in the great circulatory system: an important action, too little noticed by our physiologists, which commences in the left cavities of the heart, is continued in the entire circuit of the blood, and is perfected in the capillary extremities.



ion, is the true part played by iron in chlorosis; such, at least, is the interpretation which seems to us most rational and acceptable, drawn from the most recent researches in organic chemistry and experimental physiology, and in harmony with good sense and tradition.

Chlorosis, till very lately, was a triumph for the defenders of the chemical theory. "Evidently," said they, "this disease is due to a diminution of the iron in the blood. By giving iron, we restore the principle which is wanting, and the disease is cured. What is more simple, clear, and decisive?"

Unfortunately, the two bases of their theory, supposed to be unassailable, have been shaken by experiment. And we may add that, in the recent long discussion in the Academy, the chemists of most authority offered no new argument in support of their theory. The result of this debate and the general tendency of opinion show that chlorosis will soon, like the rest of pathology and therapeutics, be surrendered to the vitalists.

Chlorosis, we do not hesitate to say, rules the pathology of woman; and the physician who cannot recognize this affection in its various forms will often fail in treating this class of diseases. M. Nonat infers from the frequency of abnormal bruits in the neck of children that eight in ten are chlorotic (*Acad. de méd.*, 18 Septembre, 1860). This is hardly the place for a pathological dissertation; but, as we entertain certain views upon chlorosis which are not generally admitted, we shall have to place the reader at our own point of view by an explanation; it would otherwise be impossible for him to understand the close connection between affections which seem very distinct, but which, recognizing the same cause, obey the same therapeutical agency—that of iron.

In its most marked and unmistakable form, chlorosis is accompanied by the following symptoms:

General loss of color of the skin and the mucous membranes; slight emaciation, puffiness of the face and the lower extremities.

Nervous condition, hysteria, melancholia, mobility, muscular debility. Neuralgic pains, usually of irregular type.

Increase or diminution of the volume of the heart; ventricular impulse sometimes more energetic, sometimes more feeble than in a condition of health; bruit de souffle, generally soft, with the first sound of the heart; second sound sometimes sharp; various souffles in the great arteries, especially the carotids, subclavians, etc., and in the veins of the neck.

Pulse more frequent than in health; febrile heat, dryness of skin, thirst.

Panting upon the slightest movement; palpitations.

Dyspepsia, pyrosis, depraved appetite, gastralgia, sometimes vomiting, habitual constipation, diarrhoea when the disease has lasted a great while.

Menstruation painful, irregular, scanty, wanting in color, absent; leucorrhoea; menorrhagia; sterility.

Such is the picture (or the outline) of chlorosis. Under the influence

of ferruginous preparations, this frightful array of symptoms usually disappears with rapidity.

“How should iron be given in chlorosis, in what dose, and how long?” These questions have hardly been touched by therapeutists, and few practitioners have taken the trouble to study deeply. We except Sydenham, who has given the principles of good treatment, but has not sufficiently insisted on certain minutiae, of the great importance of which we are convinced by long experience.

The slightly soluble preparations ought to be used in general at the beginning of treatment. Iron-filings, aperient crocus martis, hydrate of peroxide of iron, occupy the first rank. They are given in powder in a spoonful of broth, or in preserves, morning and evening, at the two chief meals, in doses of from 5 to 15 centigrammes ( $\cdot 8$  to  $2\cdot 3$  grains). If this dose is easily borne, it is gradually increased, until by degrees the quantity of one or two grammes (15—31 grains) at each meal is reached. It is essential that the remedy should be taken at the beginning of the meal, for, if taken in the morning fasting, as is sometimes ordered, the patient feels a weight at the stomach, and a great sense of disgust, and loses appetite.

There is another reason for giving it at meals, for it is only at those times that the gastric fluids contain a sufficient quantity of acid, while, a little before eating, they are slightly acid or neutral, and sometimes even alkaline. If pyrosis exists, the best time for taking iron would be, for obvious reasons, the interval between meals.

If slightly soluble preparations are well borne, and if improvement does not occur, we must give soluble preparations, and in particular the tartrate of iron and potassium, given in pills or in gaseous waters. For certain women, we prescribe the tartarized tincture of iron, ferrated water, chalybeate wine, etc.

This treatment is not to be interrupted at the monthly period, and is to be continued till all the symptoms of chlorosis have disappeared. We then cease giving it; a month later we resume it, and continue it for two or three weeks. Then we leave an interval of two months; then we give the iron for a fortnight; and this plan is to be followed up for five or six months, for if it be easy to cure chlorosis, it is hard to cure it in such a way as to be secure against relapses, and relapses are always to be feared if we suspend the use of iron suddenly.

Chlorosis is considered by some pathologists as a very slight malady; but we consider it a very serious affection which many women never forget as long as they live, being either in continual danger of a relapse, or else (as is more common), in continual trouble from some of the functional disturbances which come in the train of chlorosis, although apparently in health.

It is also a fact which is observed as one grows older in practice, that iron, after having relieved the worst symptoms, sometimes becomes all at once impotent. The remedy, in such cases, acts with a certainty inversely



proportioned to the duration of the complaint and the number of the relapses.

Some patients have a singular experience. For a while they bear large doses of iron and improve rapidly, but suddenly they find the remedy disagrees with them, and seem to be in a sort of state of saturation. The physician should then pause, and begin again according to the method which we have mentioned above.

Evident as may be the indication for the use of iron, it is not always easy to fulfil it. The condition of the stomach and intestines—a susceptibility which cannot be foreseen—may form a great obstacle. Yet we ought to keep the aim constantly in view, and to persevere for weeks or months in modifying this irritability, or accustoming the system to the effects of iron.

Nevertheless, when the signs of chlorosis exist, we must suspect a woman who bears iron badly, for such intolerance is usually the sign of a bad diathesis.

When chlorotic patients are disposed to diarrhœa, iron ought not to be given at first, and the soluble forms should never be prescribed. For a time we should give subnitrate of bismuth, colombo, diascordium, phosphate of lime, in the dose of 25 to 50 centigrammes (3·8—7·7 grains) at each meal, nitrate of silver in the dose of 1 to 5 centigrammes (·15—·77 grain) in a draught taken during the day, to check the diarrhœa.

When we have reason to suppose that the gastric irritability is quieted, we give at first, with the above, small doses of iron-filings, or of any other slightly soluble preparation, gradually increasing the proportion of iron until it is borne in the amount of 1 or 2 grammes (15 to 31 gr.).

When there exists stubborn constipation, we add a soluble salt (as the tartrate or citrate) of iron, in pill, to aloes, and a little belladonna; giving per diem 5—10 centigrammes of aloes (·7 to 1·5 gr.), one or two centigrammes of extract of belladonna (·15 to ·3 gr.), and 75 centigrammes, 1 gramme, 2 grammes of the iron salt (12, 15, 30 grains).

Aloes has here the double advantage of acting as a laxative and as an emmenagogue. It follows that, if menorrhagia exists, as it often does, aloes must not be given, but in its place powdered rhubarb, or (still better) magnesia, to be taken before bedtime.

It is a received opinion among physicians, that chlorosis is confined to young girls, *febris alba virginum*. This idea, generally received, is false in every respect, and it daily gives rise to mistakes which have a very fatal effect upon the treatment. Chlorosis is in general a disease of adolescence, but it is also very frequent in adult life; it appears in women at the change of life; and we have seen it twice at a later period—in a woman of fifty-two, and in another of fifty-seven, both of which cases were characteristically marked, and were easily cured by iron.

We long regarded iron as a harmless agent, which it was not easy to abuse. Now that we have grown a little old in practice, we declare that

we have repeatedly seen patients whose death seemed to us due to the untimely use of preparations of iron.

It is easy to see, *a priori*, that by increasing the stimulant properties of the blood in a healthy person, we predispose him to diseases to which he had no previous tendency.

It is also easy to understand how a woman, whose blood has lost three-quarters of the normal amount of globules, may, while suffering from the accidents which belong to chlorosis, enjoy a certain immunity from the diseases which attack by preference persons whose blood is rich in these elements.

In some instances, women, though strongly predisposed by constitution or inheritance, have escaped all complaints of the chest for several years, while in a chlorotic condition; but when subjected to treatment with iron, acute phthisis has quickly followed the cure of the chlorosis.

These are positive facts, and they have been so often repeated in our sight, that we now refuse to give the preparations of iron to chlorotic women, if they have previously had suspicious symptoms of the chest, or have tuberculous parents. In these cases we try to support the strength by neurosthenic tonics, and we are not in haste to use iron, which often is speedily fatal.

We desire not to be understood, however, as systematically excluding the preparations of iron from the treatment of pulmonary phthisis. It is important to draw a distinction. We confidently state, as the result of many observations, that iron is usually injurious in the first period of this malady; we mean when the development of the tubercles is accompanied by pronounced phenomena of congestion or of irritation of the apparatus of respiration or circulation, as hæmoptyses, rough cough, fever with dryness of the skin, sharp pains in the chest, etc. In these conditions, iron, often given as an article of routine treatment, on account of the weakness and the poverty of blood, is formally contra-indicated, as is the tonic and analeptic regimen.

But at a later stage the case is changed. If a patient, for instance, has been weakened by repeated or abundant hæmoptyses, and his expectoration, sweating, diarrhœa, etc., have exhausted him, the iron preparations will then be properly used, to give a little vigor to the languid digestive and assimilative functions. Unhappily, however, in these cases, iron loses a great part of the wonderful virtues which it possesses in chlorosis and in accidental anæmia succeeding simple hæmorrhage. But, while it accomplishes nothing against the tuberculous diathesis itself, it is sometimes useful by helping the unhappy patient to struggle for a time with the cachectic state, which is more injurious to him than the local lesion.

The greatest circumspection must be used in these cases. Circumstances may seem imperiously to demand the use of iron, but it will not always be well borne, and in general, it is far from being so harmless as many practitioners imagine. These remarks apply with especial force



to tuberculous phthisis, in which experience has shown that iron generally does more harm than good. Phthisis of scrofulous origin differs from this in the slowness of its course, the slighter intensity of the inflammatory and reactionary symptoms, and especially in its greater tolerance of tonics and excitants. Thus, in children who are at the same time lymphatic and strumous, affected with caseous pneumonia and tubercles in the mesenteric glands, it is not uncommon for iron, in moderate doses, to improve the nutrition, sustain the vital resistance, and check the progress of the malady for a time.

In general, as we said above, a practitioner ought to distrust a chlorotic patient who bears iron badly at the outset of the first treatment, or whose condition is not modified by a proper administration of it. He should infer the existence of some latent diathesis, or grave organic disease, or moral affection, holding the chlorosis under obstinate control.

The tuberculous diathesis is often masked under the form of chlorosis. The physician vainly attacks the apparent disease; obstinate gastralgia, continued diarrhœa, painful palpitations of the heart, troublesome oppression, sanguine congestion of the face, especially at evening and after eating, are produced or persist, and the blood is slow to regain the globules which it lacks; happy are they whose blood does not restore itself at the physician's will, for they will pay, by a speedy disorganization of the lungs, for this momentary hope of health.

In practice, whenever a young girl has some symptom of chlorosis, or merely anæmia, iron is sent for in haste. A commencing phthisis is thus often spurred into activity. Doctor Millet, of the colony at Mettray, has had more than sixty cases of phthisis in which preparations of iron have been given by nuns or druggists, to the great injury of the patients.

A cachexy, which completely resembles chlorosis, is often associated with albuminuria, chronic engorgement of the liver or spleen, or a valvular lesion of the heart. Here, at least, iron does no harm; it is even of unquestionable utility in the treatment of the anæmia, which appears to depend on hypertrophy of the spleen or liver, especially when these lesions follow intermittent fevers, and are not accompanied by organic lesion.

#### COMPONENT ELEMENTS OF CHLOROSIS.

The group of symptoms which we have named is not always found combined in chlorosis; most frequently, in fact, some of them are absent. To use the happy expression of Récamier, the symptomatic *phrase* is incomplete; but it is necessary to recognize it even in its incompleteness, or else we shall fail to attack the root of the malady, and shall be struggling with a mere accident, which may be banished for a moment, but will soon return with equal intensity in the same or a different form.

Paleness of the blood, and of the skin and mucous membranes, may exist alone without any symptoms besides shortness of breath and disor-

dered circulation. This form is the simplest; it is easily recognized and cured.

But quite often the common symptoms of chlorosis, as the nervous symptoms, indigestion, menstrual disturbances, appear together or singly before the pallor has reached its maximum; and then the common run of doctors—men who require all the elements in order to form a diagnosis—fail to see chlorosis, which really exists.

*Nervous symptoms.*—Women are often attacked by hysteria, by spasms, after great losses of blood, accouchement, lactation; so are young girls at the beginning of chlorosis. These nervous troubles easily yield to preparations of iron, although hysterical convulsions are not so easy to conquer as essential spasms. When, however, this spasmodic condition exists in a vigorous, high-colored woman, who exhibits none of the signs of chlorosis, iron increases rather than diminishes the convulsions.

*Neuralgias.*—These are almost a constant symptom in chlorosis; of twenty chlorotic women, nineteen, perhaps, will have neuralgia.

The disease is not always very easy to recognize, and the patient and physician may both be deceived. Women complain of pain in the head or stomach, in the side or legs, etc. A superficial examination shows nothing but a common headache, a stomach-ache analogous to that which accompanies difficult digestion, vague pains, attributed to fatigue or exhaustion; but when they are examined closely their neuralgic nature appears. The pain in the head occupies the brow, the temples, the region of the jaw, the teeth—in a word, the course of the nerves of the fifth pair and its branches; it scarcely ever attacks both sides at once, but it passes from right to left, or remains fixed in one point. All at once it shifts its place and occupies the region of the stomach, then it leaves the stomach and goes to the intercostal nerves, to the sciatic, or some of its branches, or the various branches of the lumbo-abdominal plexus. Then the cephalalgia reappears at the moment when the other pains cease.

This inconstancy in the seat of pain is very remarkable and very common; but sometimes the neuralgia affects a single region, the head, the stomach, or some intercostal nerves. It is rarely fixed obstinately in other parts, but we have observed it in the nerves of the heart, the clitoris, the superficial cervical plexus, one of the branches of the brachial plexus, the pharyngeal plexus (Türk: *Arch. de méd.*, 1862); but these cases are rare.

These forms of neuralgia, if we attend closely to them, are rarely seen in men, being confined almost wholly to feeble women, with distinct symptoms of chlorosis, past or present.

When neuralgia is the leading feature, whether occupying the head or the stomach, it is usually cured by iron, though less easily than simple chlorosis.

Temporo-facial neuralgia (called so improperly *tic douloureux*—a name which should be reserved for spasmodic neuralgia) has been treated



with advantage by large doses of subcarbonate of iron. Hutchinson, who may be regarded as the author of this method (Benj. Hutchinson: "Cases of Neuralgia Spasmodica," London, 1812), has observed nearly two hundred cases of cure. He gives from 2 to 4 grammes (30—60 grains) of subcarbonate mixed with honey, three times a day. Wittke has obtained the most happy results from it, in the dose of  $1\frac{1}{2}$  grammes (22 grains) with  $\frac{1}{4}$  gramme (4 gr.) of cinnamon, three times a day (Hufeland: *Journal*, 1828, Vol. 4). The English journals are full of similar observations. M. Caulet reports remarkably rapid cures with the waters of Forges (Caulet: *Remarques sur l'action sédative immédiate des sources ferrugineuses de Forges-les-Eaux*, Seine-Inférieure, 1867).

Having made a great many experiments in the therapeutic use of iron, especially the subcarbonate, and in cases of neuralgia, we can easily see the cause of the differences in opinion which exist. When given to chlorotic women, or in cases of neuralgia in incipient chlorosis, it has usually succeeded; but if given to men, or to women who were not chlorotic, it has usually failed. These results may be formulated by saying that the beneficial effects of preparations of iron in neuralgia are entirely due to the fact that the disease usually depends on chlorosis, which is curable by iron.

The cure of neuralgia by iron is not a rapid one, but requires a week, a fortnight, a month, or longer, in order to be complete. If the face is affected we always employ Hutchinson's method to quiet the accesses, and use without delay local applications of stramonium, belladonna, or chloroform, and hypodermic injections of sulphate or muriate of morphia; when the pain is relieved by these means, iron becomes of use by curing the general condition upon which the disease depends; it has thus a powerful effect in preventing relapses. It has not seemed to us that the carbonate of iron has any special utility, but that all the preparations of iron, if given in large doses, possess the same properties.

*Gastralgias.*—In chlorotic women, or women who present some of the symptoms of chlorosis, gastralgia has certain special features upon which it is necessary to dwell. At the outset it is not continuous, but returns at intervals of two, three, or four days; at a later period the intervals diminish, and the attacks occur daily, or several times in the twenty-four hours; their return is most apt to be caused by eating something. If the food is of a class which fatigues the patient, the pain may follow directly upon the ingestion; but in the great majority of cases the time elapsing between eating and the occurrence of pain is at least two or three hours. The sensation is sometimes that of a weight in the epigastric region, sometimes it is a pain resembling violent hunger, sometimes cramps or heat referred to the same region; it is usually confined to these parts, but may extend to the neighboring regions, and is almost always felt behind the sternum and in the back at the level of the stomach. It is often complicated with intercostal neuralgia, as M. Bassereau has remarked, and even seems to be an extension of this malady. The pains



are mostly accompanied by a sense of oppression, revealed by deep inspirations, yawning, and a desire to undo the garments which press closely upon the spot. And yet, spite of this frequent and often protracted suffering, digestion is perfect, food is retained, nutrition is effected suitably, and the fæces, by their consistency and appearance, indicate complete digestion of food. The appetite experiences a more or less distinct alteration, hunger is keen; but as soon as any food is swallowed an invincible satiety is felt. Yet some eat much and greedily; but the meal is hardly ended when they are hungry again, and their hunger sometimes comes so suddenly and so frequently that they place food by their bedside to consume in the night. Thirst is commonly increased, though there is neither fever nor excessive secretion; it shares in the derangements which all the sensations connected with the digestive canal experience. In a word, sensation is disturbed, and function may be intact.

By these marks we recognize distinctly a nervous affection, and we cannot confound these symptoms with those of chronic gastritis, which is commonly accompanied by disgust for food, sharp pain just after eating, difficulty in digestion, and is soon followed by diarrhœa and wasting. We should also remark that the pains dependent on chronic gastritis never disappear, to be replaced by neuralgia of the face or head, and conversely, as is the case in gastralgia. This point is of great importance, for when an affection thus shifts its locality, its different manifestations probably have the same seat and nature, as may be seen in the progress of a catarrh or a rheumatism.

We have not spoken of heart-burn and vomiting as diagnostic points, for experience has shown us that these symptoms are sometimes found in purely nervous gastric affections, and we think they may be neglected as differential signs.

Gastralgia, once established, is accompanied by more or less marked derangement of the intestinal functions; the stools become infrequent, the fæcal matters hard, and colics are common.

Gastralgia is almost always accompanied by leucorrhœa. This discharge gives no indication as to the usefulness of iron, for it is observed equally in certain gastralgias in which iron is far from suitable.

The form of gastralgia which is common to men and women who present no symptom of chlorosis, is of a remarkably fixed character, very different from that we have just described, and often alternating with neuralgic pains which occupy different parts of the body. In women it may coexist with a high complexion, moderate, but bright red menstrual discharges, and chronic leucorrhœa; chlorotic gastralgia is also accompanied by leucorrhœa, but the menstrual blood is light-colored, and the complexion usually pale. Chlorotic gastralgia is quite readily curable by iron, but the other kind is almost always aggravated by the same remedy.

Iron, under whatever form it may be given, is useful in chlorotic gastralgia; steel-filings, æthiops mineral, subcarbonate of iron, hydrate of



peroxide of iron, are the forms most commonly used. At the outset, we should always avoid the soluble preparations, because they often increase the pain. Iron is to be combined at first with a bitter extract and some aromatic.

It sometimes happens that a minimum dose of iron increases the gastralgia for several days. This will discourage the patient, but not the physician. Let him continue with the same doses until the gastralgia is at the same point as before the treatment was begun; he may add to the iron some centigrammes of belladonna powder. The dose of iron is then to be increased, and so on until at each meal 2 grammes (30 gr.), or at least  $1\frac{1}{2}$  grammes (23 gr.) of filings are taken. Then the soluble preparations may be used, and continued till the close of the treatment. We ought to enjoin the same precautions as are suitable in the treatment of chlorosis, namely: that the iron should be suspended and resumed several times, and even when gastralgia is quite cured.

When pyrosis coexists with gastralgia, iron is usually ill borne. We must then begin by giving magnesia in a slightly laxative dose for several days, and after a little while an infusion of quassia or simaruba. After this preparative treatment, iron will find its opportunity.

What we have said of neuralgia of the face is also applicable to gastralgia. It sometimes happens—especially in women who have had pains in the stomach for years—that, in spite of the use of iron, and long after the appetite and strength have returned, the gastralgia persists with discouraging frequency. In such cases the cure is completed by plasters of theriac, frictions with cerate of stramonium or belladonna, ammoniacal blisters, either simple or dressed with morphine, cauteries, moxas, the internal use of bismuth, magnesia, the poisonous solanacea, opium. The same list of remedies may be useful in certain cases in combating an increase of pain, caused by the use of iron at the commencement of treatment.

It remains to point out certain precepts in regard to regimen.

The food which the stomach digests without pain varies with almost every patient; some can endure nothing but milk; some are less tried by meat than by vegetables; others desire meat-pies and similar dishes.

These idiosyncrasies must be taken into account in regulating the diet, for we must not imitate those physicians who, considering the digestibility of foods as an absolute property, impose the same diet on all their patients; we must have regard to the susceptibilities of individuals, and, however bizarre they may seem, follow the lead which they offer. This is the method which we have followed as constantly as possible, allowing to the patient such articles of food as her daily experience has shown to be the most digestible. We have also striven to limit the quantity to one-quarter or one-half of that which a person in health would take; and when there is no dislike to any article, we order rich broths, white meats, roast meat, etc., avoiding as much as possible the farinaceous vegetables, such as haricots or lentils, the too frequent use of which in hospitals is



certainly one of the causes which render success less frequent in them than in private practice, in which green vegetables and fruits are prescribed.

Neuralgias occupying other parts than the nerves of the face and stomach must be treated exactly like temporo-facial neuralgia as regards local means; and as regards the chlorosis, by general means.

*Asthma.*—*Amaurosis.*—*Whooping-cough.*—There are certain neuroses which have been advantageously treated by iron, among which are the above.

Nervous asthma has been cured by M. Battaille of Versailles by martial preparations continued for a long time in large doses. He has treated three cases thus: all were women; the first was evidently chlorotic, while the other two did not seem to be. But even if the asthma were an accident of chlorosis, the therapeutic success of M. Battaille is still of great importance, as serving to confirm the fact which we have so often mentioned, to wit, that therapeutic indications are more frequently drawn from the general condition of the patient than from local symptoms.

M. Blaud of Beaucaire has reported in the *Bulletin de thérapeutique* (t. XVII. Nov., 1839) the case of a chlorotic woman who had suffered from amaurosis for a year. The physician believed that the blood, in its existing state of impoverishment, did not supply a proper stimulus to the organ of sight. He gave iron, and the patient recovered her sight and her health at the same time. M. Bretonneau made the same observation in the case of a man who had become cachectic as a result of prolonged intermittent fevers.

In whooping-cough, Drs. Steymann and Chisholme have praised the subcarbonate of iron. This remedy is not employed alone at all stages. The authors strictly prohibit it during the first period, and order that emetics shall always be given previously. Several well-proved facts seem to bear testimony in favor of this treatment. The dose of subcarbonate is from 50 centigrammes to 4 grammes (8—60 grains). In a few days, according to these physicians, the violence of the attacks ceases, and soon nothing remains but a catarrhal cough. We regret that we have not tried this plan in our own practice.

*Menorrhagia.*—*Amenorrhœa.*—*Hæmorrhage.*—*Anæmia.*—Many physicians, good observers, too, think that chlorosis is necessarily characterized by a marked diminution or a total suppression of the monthly flow. They regard the menorrhagia, that is, the excessive flow, as so rare an occurrence that they formally exclude it. But they cannot have failed to see often, in their own practice, women who are deeply anæmic and suffer from all the general symptoms of chlorosis, who suffer abundant losses of blood every month. In this case they make a distinction; they call the latter class anæmic, and those whose menses are deficient, chlorotic.

And yet, as we just said, these anæmic women have all the symptoms of chlorosis—the extreme pallor, the deficient color of the blood, the



bellows murmur in the heart and the chief vessels, and the various neuralgias; so that, if we should examine all their functions except those of the generative organs, we could not fail to see chlorosis.

We shall try, in our turn, to make a distinction between anæmia and chlorosis. Anæmia is an accidental condition, caused directly and without an intermediate stage by a great loss of blood; a person becomes anæmic in a few days or hours. Chlorosis is a permanent malady, usually slow in developing, and slow to leave the patient; always ready to be produced by apparently the most indifferent cause. Anæmia is essentially a transitory state; a few weeks are enough to restore the blood and the strength completely, without any other remedies but a good diet. Relapse is never to be feared unless a new loss of blood occurs.

M. Bureq has added certain other points of distinction. He says that he has observed that cutaneous sensibility is normal in anæmic patients, and changed in the chlorotic; the anæsthesia differs in the different regions of the skin. He adds that muscular force in the anæmic is nearly equally diminished in all the muscles, while in the chlorotic the loss of force differs in the different groups of muscles; in an anæmic person, the relative power of the right and left arm, for instance, is as in health, while in the chlorotic, the right side may be more weakened than the left, or inversely if the person be left-handed (*Gazette des hôpitaux*, 1864, p. 118).

Up to this point the distinction is as clear as possible; but in practice, nature by no means divides the sick into two such separate camps.

We may see every day the action of moral causes in producing chlorosis in a woman or girl; still oftener, the malady dates from the first application of leeches, which evacuated but a small quantity of blood.

If we understand this, we can easily see how an abundant bleeding at the nose, venesection, or repeated leechings, or a large menstrual discharge, may bring a patient into such a condition that chlorosis appears. Instead of simple anæmia, transitory, and curable by nature unaided, there is a special state of the economy in which the blood becomes more pale and fluid every day, although the original losses of blood have not been repeated.

Here, then, anæmia has become the starting-point of chlorosis; it has predisposed the economy to chlorosis, has rendered the latter easy, and its development rapid.

It is now proper to see what part anæmia and chlorosis may play in hæmorrhages.

We need not attend to the classic distinction between active and passive hæmorrhage; but we must admit that hæmorrhages from the uterus, and others, are sometimes associated with a condition of energetic reaction and a superabundance of life, and at other times occur in persons in exactly the opposite state. We will admit that in all hæmorrhages (traumatic and hypostatic excepted) there is a previous local action, analogous or identical with the first phenomena of inflammation; but we must exclude from present consideration all except general organic conditions.

The general state of the system plays here an extremely important part. When the menstrual molimen is the same, but the condition of the blood is different, it is impossible that the flow should not be considerably modified by the degree of plasticity of the blood; and, in fact, it is modified.

To take the simplest case first: see what happens in a recent wound in a vigorous, plethoric man, and in one who is profoundly anæmic.

In the former, the hæmorrhage is slight and quickly stops; though large arterial trunks have to be tied, it is needless to use a hæmostatic to arrest capillary bleeding; but in the other, even after the smallest trunks have been tied, a considerable amount of blood or of reddish serum continues to flow, which stains the dressing deeply, and by its abundance may involve danger to life.

What is observed in men may be seen in the different species of animals. A dog's legs may be cut off, he may suffer enormous mutilations, without danger to life from hæmorrhage, while rabbits die from bleeding after a slight wound. The plasticity of the blood of dogs forms an obstacle to hæmorrhage, while the liquidity of the blood in rabbits favors it.

The tendency of anæmic persons to hæmorrhage is marked, from the moment the loss of blood has occurred. If leeches are applied to a child for the first time, the loss of blood will be much less, other things being equal, than that which will follow the second application; and this, still less than at the third; until (as we have, unfortunately, often seen) the bite of one leech may cause a fatal hæmorrhage in a child previously exhausted by bleeding.

But if anæmia, considered as a transitory and as it were acute condition, may have such an immense influence on hæmorrhage, how much greater will be this influence if it has lasted for a long time, especially if chlorosis with all its accompaniments has been developed!

Now let us transfer to the mucous membrane of the uterus that which we just said in general. If a woman or a girl has an excessive menstrual discharge, the interval between the periods will doubtless suffice for some months to restore the blood; but the repetition of the same accident will soon bring on anæmia, and at last chlorosis. If the molimen remains the same, the flow, as we showed above, will become more abundant, and chlorosis, a cause of the increase of hæmorrhage, will itself be aggravated by the hæmorrhage; and the patient, revolving in this circle, will soon be in danger.

Let us therefore not lose from sight these leading facts: chlorosis is produced by excessive menstrual discharges; chlorosis may render the discharge still more profuse. In other words—

Too copious menses cause thinness and dissolution of the blood;

Thinness and dissolution of the blood are a cause of uterine hæmorrhage.

There is, then, a form of chlorosis which might be called menorrhagic. Is this form common in young girls? It is rare; we estimate from our



records that it forms the twelfth part of the cases. In adult women it is more common. Yet we would say that our observations in private and hospital practice do not include a sufficiently large number of facts to furnish complete statistics.

We have collected a considerable number of cases of menorrhagic chlorosis, both in young girls and in married women. Not one of these patients had uterine lesions; this fact we proved by examination of all the married women; but in the case of the girls, where such examinations would have been difficult and unsuitable, we judged from the rapidity of recovery, and the good health which we observed for several years afterwards, that the uterus was exempt from severe lesions.

In speaking of treatment, two principal points are obvious: one, menorrhagia; the other, chlorosis.

Menorrhagia is combated by remedies which we usually think contra-indicated in chlorosis; the treatment of chlorosis is supposed to be apt to excite the menstrual flow. It would seem impossible to avoid striking upon one of these two rocks.

Let us consider whether the preparations of iron are really emmenagogues. It cannot be doubted that iron restores the health and the uterine flow in a chlorotic woman who has amenorrhœa; but does the iron act as an emmenagogue or as a reconstituent?

Whenever we give ferruginous drugs in cases of chlorosis complicated with amenorrhœa, the first phenomenon observed is a return of color to the tissues, and at the same time, diminution of the depraved appetite, the pains in the stomach, the palpitations of the heart, shortness of breath, bellows murmur in the blood-vessels, thirst, etc., so that, after six or eight weeks of a properly conducted treatment, the appearance of most vigorous health returns; all goes well, but the courses do not yet appear. If we continue the treatment it is not rare to see actual sanguine plethora supervene while the menses are still absent.

Health is then re-established, chlorosis is cured—but amenorrhœa persists. Soon, in their turn, the menses appear and take the normal course. In such a case, iron acts at first as a reconstituent; and after the health has been re-established, the functions of health, including menstruation, are re-established in their turn. The patient does not recover health because her menses have returned under the influence of iron, but, on the contrary, the menses return because health has been recovered under the influence of iron. The point is completely proved, for if it were otherwise, we should have seen the return of menstruation give the signal for the return of health; whereas the contrary has occurred.

It is because they have not followed the evolution and succession of these different phenomena that practitioners have always imagined iron to be an emmenagogue; and this error, accredited for ages, will long continue to prevail against the most manifest facts, against the closest observation, for we are so made as to like to hold to an error, and to resist truth obstinately.

To go further, not only is iron not an emmenagogue, but, on the contrary, it is a hæmostatic. Thus, the experiments we have made on a large scale in our hospital show that, in women whose menses are regular, and who are free from chlorosis, the use of iron most frequently retards the menstrual flow and diminishes it. We say most frequently, and not always.

Next, let us see how the indications in menorrhagic chlorosis are simplified :

Leading indication, to treat the chlorosis.

Secondary indication, to treat the menorrhagia.

And the latter is so truly secondary that we scarcely ever have time to attend to it.

In fact, by giving iron in large doses between two menstrual periods, we easily restore the plasticity of the blood; before twenty-five days are past the complexion has regained almost its normal color, the subcutaneous veins have recovered their volume and their bluish tint. When, therefore, the menses reappear, the blood is already in such a condition that hemorrhage is less easy, and the discharge is often much less abundant, though much more highly colored.

We have sometimes, nevertheless, seen menorrhagia increased in spite of the treatment, and perhaps as a consequence of the treatment; but even in this case the debility and pallor which used to follow the menstrual period were much less marked than in the preceding month, and a few days made up for the loss. But observe that in such a case, even when the loss of blood is absolutely greater than before, the relative loss is much less. It follows that the health suffers nothing, or next to nothing, from the bleeding, since the injury is repaired almost at once by the treatment.

But if, in spite of the use of iron, menstruation is as abundant as previously, if its amount is even increased, there are other remedies which almost always suffice, in the front rank of which we would place powdered ergot, digitalis, acids, rhatany, plugging, powdered bark of yellow cinchona given in doses of two or three grammes a day (30—45 gr.), etc., etc.

As soon as the menses are over, we must resume the use of iron for eight or ten days, in a dose proportioned to the patient's weakness. If a little anæmia or chlorosis remains, we should insist on iron during the entire month, and even during the menstrual period, unless the menses are so abundant as to require the use of another remedy.

Such, in rapid outline, are the practical rules, to which the physician may add those details which are best taught by having to treat an obstinate malady.

Nose-bleed, in chlorotic patients, observes the same laws as uterine hemorrhage. We have known a young lady of twenty-one who had extremely abundant nose-bleed every day. Acids, astringents taken internally and by injection into the nasal cavities, had been tried in vain ;



powdered cinchona, taken internally, which almost always succeeds in these cases, had likewise failed; the bleeding returned continually. The use of large doses of subcarbonate of iron cured the chlorosis and greatly checked the loss of blood.

It would be a mistake to suppose that uterine and nasal hæmorrhage is cured by iron only in the case of chlorotic young girls. We have treated several cases in women at the turn of life, who were exhausted by repeated metrorrhagia. In spite of the apprehensions of the physicians who met us we insisted on preparations of iron, and succeeded in easily checking the hæmorrhage. This practice is conformable to that of Phil. Frid. Gmelin (*"Dissert. de probato tutoque usu interno vitrioli ferri adversus hæmorrhagias spontaneas largiores"* (Tübing., *"Thesaur. mat. med.,"* t. II.).

Iron in this case has a double action, as we said above. At first it repairs the losses of cruor and fibrin; next, it increases the plasticity of the blood, makes it more coagulable, and thereby lessens its facility of escape.

Very unlike the other hæmostatics, which for a moment increase the coagulability of the blood without restoring its constitution and relieve only the actual symptom, iron may be of use in certain phases of melæna and hæmorrhoids; not as combating the organic lesion which gives rise to hæmorrhage, but as remedying the consecutive anæmia; by restoring the plasticity of the blood, it may cure, if the hæmorrhage depends solely on the liquefaction of the blood, and may limit, if the liquefaction, though consecutive, is itself a cause of hæmorrhage. In a word, we must repeat here that which we said before under metrorrhagia. Let us recall the results of the analyses made by MM. Andral and Gavarret. They found that, in cases of sanguineous apoplexy with effusion, the globular portion was more abundant than in most patients. In these hæmorrhages, justly called active, iron would very probably be injurious. But if these observers had analyzed the blood of persons exhausted by hæmorrhoidal flux, they would have clearly found a diminution of the globules, which would have proved the propriety of using iron.

We may then conclude: 1st, that iron is not an emmenagogue; 2d, that in chlorotic patients it seems to provoke the menstrual discharge, because it cures the chlorosis; 3d, that in women in health it usually modifies the uterine flux; 4th, that it restrains uterine hæmorrhage, at least, when apparently disconnected with plethora; 5th, that it moderates the various hæmorrhages which occur in chlorosis.

*Dysmenorrhœa.*—When the menses are painful, and the blood a little discolored, the use of iron in the interval very often suffices to put an end to the symptoms; but when this treatment is inadequate we should add vaginal injections of a strong decoction of stramonium or belladonna, or of a little oil, in which a few drops of chloroform are dissolved.

*Sterility.*—The preparations of iron make women fertile; this fact is as authentic as its emmenagogue properties, and was clearly stated by



Hippocrates (Opera, ed. Foesii, t. I., sect. v., p. 686). The fact is easily explained. Chlorotic women are usually sterile, and so are those whose menses are excessive or very painful; iron, therefore, which relieves all these troubles, is readily seen to be capable of relieving the sterility which is due to them. M. Blaud, of Beaucaire (*Bulletin de thérapeutique*, t. XVII., nov., 1839), has added facts which confirm this view.

*Cachexiæ*.—To say (as did the writers of former centuries) that iron cures the cachexiæ, is to use a very vague expression; yet the expression is true in some points.

If the serous portions of the blood predominate, in consequence of cancer or scrofula; if hæmorrhage from a cancerous ulceration causes anæmia; if poor and insufficient food impoverishes the blood, there is no doubt that by the use of iron we may get, not a cure, but a beneficial modification of the general health; but the hope of cure which may arise is always destined to disappointment, since the cause remains, and is more mighty to destroy than the remedy to build up.

*Dropsies*.—*Visceral engorgements*.—It is certain that in a very advanced stage the heart no longer fulfils its functions normally, and that, besides, the blood has not its natural qualities. The consequent disturbances of circulation, both general and capillary, affect the economy in the same way as if there were an organic lesion of the heart. Hence, engorgement of the lungs, hypertrophy of the liver, dropsy, anasarca. Iron, by curing chlorosis, cures all these symptoms; but we must not infer that iron can cure them when due to other causes.

*Intermittent fevers*.—In the same way we may speak of the influence of iron, not on the fever, but on the accidents which may retard a cure or provoke a relapse. Bretonneau has shown that the miasms which cause these fevers, before they developed into well-marked paroxysms, often produced anæmia; that intermittent fever developed with a readiness proportioned to the amount of blood which the patient had lost, or the degree to which the blood was impoverished; that the fever, after lasting some time, brought about—especially in women—a very pronounced state of anæmia, so that anæmia was at once a predisposing cause and an effect.

Sydenham and Stoll knew from experience that chalybeate wine, and, in general, the preparations of iron, are a useful adjunct to cinchona. Bretonneau, in imitation of these great masters, introduced it into his hospital practice, and found it extremely useful in preventing the access and return of intermittents, and in curing the leuco-phlegmasia and the splenic engorgement which follow prolonged fevers. He was accustomed to give iron in these cases several months at a time, with preparations of cinchona. The direct febrifuge action attributed by Marc to iron (*Journ. gén. de méd.*, 1810), by Martin (*Bulletin de la Société méd. d'émulation*, août, 1811), and by d'Autier, in a good many experiments made by Bretonneau and M. Barbier, of Amiens, has not been proved.

As regards the use of Prussian blue as a substitute for cinchona in



treating intermittents, we will speak further of it under the head of preparations of cyanogen. We will state, however, that we have very little faith in its efficacy in the class of cases which we are considering.

*Scrofula*.—Among the many remedies used in this disease, iron occupied the first rank before the discovery of iodine. But its action is very equivocal, and the known efficacy of iodide of iron in these diseases is not a sufficient proof.

Certain experiments have been made by Cl. Bernard upon animals, and have been repeated by M. Quevenne upon himself with much care, which show that iodide of iron, when introduced into the stomach, almost immediately undergoes a sort of resolution into its constituent elements. In a very short time, iodine, having been rapidly absorbed, is found in the saliva, and passes in considerable quantity into the urine. This elimination continues, at first in increasing amounts, then decreasing, so that after forty-eight hours three-fourths of the iodine ingested has been rejected by the emunctories, while after the same time the quantity of iron absorbed and carried away by the metalloid is hardly appreciable. From this extreme difference in the results of absorption may we not be justified in inferring that in the very special affections for which iodide of iron is habitually used (that is, in scrofula), the greater part of the action is due to iodine, without claiming that that of iron is absolutely null?

*Diabetes*.—Heine, of Berlin, regards the sulphate of iron, taken internally, as a kind of specific for the diabetes mellitus of children. He quotes from the *Journal des maladies des enfants* two cases which seem quite convincing; but before pronouncing upon the efficacy of this remedy, we shall see whether our personal experience confirms such rapid results in a disease usually so obstinate.

*Leucorrhœa*.—*Blennorrhagia*.—In simple utero-vaginal catarrh connected with chlorosis, iron has a manifest utility; but it increases the white discharges in women of high complexions. It has very little influence upon the leucorrhœa which accompanies ulceration of the neck of the womb.

Blennorrhagia has been cured by iron in some cases; in the last stage of the disease, after the symptoms of inflammation are gone, workmen often cure themselves by drinking for several days large quantities of the water in which the forge-men quench red-hot iron, which contains a good deal of iron. It would doubtless be better to use large doses of ferruginous preparations, or of the tartrate or chloride of iron. We will add that M. Ricord very often uses a solution of tartrate of iron and potassium (4—8 grammes to 100 grammes of water) to dress venereal ulcers, especially when these ulcers threaten to assume a phagedænic character.

*Preservation of water*.—For some time, sheet-iron boxes have been used to hold the water for long voyages. The subcarbonate of iron, which forms and dissolves in minute quantities in the water, has the double advantage of preventing the développement of plants and infusorial

animalcules, and consequently preserving it from corruption, while it also acts favorably on the health of the sailors.

*Poisoning by arsenic.*—The hydrated sesquioxide of iron has been recommended in the treatment of poisoning by arsenious acid.

In this case an insoluble arsenite of iron is formed; or at least, a salt so far insoluble that purgatives can remove it before it has time to affect the system. But the arsenite of iron is easily dissolved by the hydrochloric and lactic acids which are naturally formed in the stomach; it is therefore important to neutralize them, which may be done by giving the sesquioxide in excess.

This important remedy can only be of use when the physician is very quickly called, for a few moments are enough for arsenic to inflict general and local injuries which are irremediable.

In certain medico-legal cases it may become of extreme importance to know that the hydrated sesquioxide of iron itself is often arsenical, when prepared from commercial sulphate of iron.

*Poisoning by salts of copper.*—Iron-filings are among the best antidotes in cases of poisoning by salts of copper. The filings should have all their metallic lustre. The reaction is as follows: an innocuous salt of iron is formed, and the copper is precipitated in the metallic state.

### USE OF PREPARATIONS OF IRON IN EXTERNAL MALADIES.

The soluble preparations usually possess more or less astringent power. They drive the blood from the tissues with which they come in contact, they suppress or modify the secretions, they arrest or check hæmorrhage, and in general, all kinds of flux; in a word, they exactly satisfy the various requirements which we commonly try to meet by the substances called astringents. In this respect it is important to establish one distinction. The insoluble preparations are preferable for internal use, and the soluble for external; but the latter may also be used internally.

Among the soluble salts most in use for external application, are the sulphate, the muriate, the acetate of the peroxide, and especially the perchloride, which deserves our more special attention.

### PERCHLORIDE OF IRON.

*External Use.*—For some years this agent has held an important place in therapeutics, both as a hæmospastic, and as a hæmostatic and astringent.

Every one knows that Pravaz was the first to use it by injection in the cure of aneurism.

The first trials were far from encouraging; but it seems to have had better luck since: some half-successes in certain aneurisms, more complete



successes in the treatment of varices and hæmorrhoids, both with the perchloride and with the acetate of the peroxide, are the latest results; so that the method seems to have some chance of redeeming the disgrace into which its first failures cast it.

Further careful trials are needed before we can definitely judge of this great question.

If the treatment by injection, in diseases of the arteries or veins, triumphs over the immense obstacles which arrested it at its birth, the honor will belong first to Pravaz, who took the initial step, and next to the intelligent perseverance of the surgeons of Lyons.

However doubtful may be the value of perchloride of iron as injected into the blood-vessels, there is no doubt as regards its external use.

In a mémoire presented to the Académie des sciences, in September 1853, M. Pétrequin mentioned a large number of cases in which the perchloride of iron, or of iron and manganese, may be used with advantage externally.

Thus, when the bleeding comes in a sheet, from a wounded surface, he states that it suffices to wash the surface with cold water, and then to apply a compress soaked in a mixture of a teaspoonful of the concentrated solution of perchloride in a glass of water. If the flow is not arrested, we shall succeed by adding to the mixture a second teaspoonful of the perchloride.

If the wound is unequal and irregular, a tampon of charpie moistened in the same liquid is used before the compress. This procedure may suffice even when the bleeding comes from a small artery. The charpie might be replaced by amadou, sponge or linen, which will further serve as a compressor of the vessel.

A plug of charpie or amadou dipt in pure perchloride and applied with the finger instantly checks the blood from leech-bites.

This measure has succeeded in cases of epistaxis where plugging and other hæmostatics have failed.

We are acquainted with no better means of arresting dental hæmorrhage, which, as we know, is sometimes so refractory.

The solution of perchloride has been proposed in sanguineous tumors, hæmorrhoids, vascular fungi; and by Dr. Yvonneau (*Bulletin de la Société d'Indre-et-Loire*, 1854) in the treatment of ingrowing nails.

This solution has been of good service in various affections of the genital organs, especially in metrorrhagia, leucorrhœa, and laxity of the vaginal walls.

The remedy may naturally be used in engorgements of the neck of the uterus, especially those varicose or inflamed states which have been of late commonly treated (perhaps a little abusively) by caustics and heated iron: for where alum or tannin, applied locally, often cures, much may be expected of a remedy possessed of properties so remarkably astringent, resolvent and hæmostatic. The trials which have lately been made have entirely justified these hopes. Employed alone, or, still better, associated



with collodion, the solution has effected in the above-named class of cases cures which promise well for its future career.

M. Pétrequin says that the perchloride is an excellent antiseptic in gangrenous wounds and fetid suppurations. Washing with a solution of various strength rapidly removes the fetor—a property important in the hygiene of hospitals.

For some years past a large number of physicians, including Drs. Bourot and Salleron, have studied the disinfectant and antiputrescent virtues of perchloride of iron; it may be said that the excellent results obtained in purulent and putrid affections, in all ill-conditioned sores, and especially in hospital gangrene, insure to this remedy an important place in surgical practice, especially military surgery. In this respect we may say that the perchloride may rival the most renowned antiputrescents, such as the iodated preparations.

The perchloride has also been used in a great variety of obstinate scrofulous affections of the skin and mucous membranes; and M. Bazin, among others, has found it very useful in certain malignant scrofulidæ. It has been used with success in some parasitic diseases, as mentagra, tinea, acne.

Finally, there is another instance of external use which deserves special mention: the use as a preservative from syphilis. We owe this new application to Dr. Rodet, a distinguished physician of Lyons. Its importance may be immense, if the future confirms the results which are announced.

Let us say, first, that the perchloride of iron, whatever its degree of concentration, does not of itself suffice to confer this immunity; but that, in order to insure complete efficiency, a free acid, such as muriatic—or better, nitric—must be added to it.

M. Burin de Buisson, who has carefully studied the chemical action of the perchloride, explains the necessity of this addition as follows: When the perchloride is applied over the point of inoculation, the immediate effect is the formation of a coagulum in the albuminous portions of the blood, which, acting as a plug, prevents the preservative liquid from penetrating deeply enough to reach and completely destroy the virus. Now, the addition of an acid removes this obstacle by redissolving the coagulum, and by aiding the penetration of the perchloride into all the folds of the mucous membranes and the interior of the tissues to which it is applied.

According to the same chemist, the perchloride acts by coagulating, and not at all by cauterizing; it preserves, by forming an obstacle to the absorption of the virus, by drawing out the albuminous fluids which surround the inoculated point, and causing them to coagulate as they approach that point. In this way the virus, seized and imprisoned as it were in the midst of the albuminous coagula, is first neutralized, or destroyed, and soon eliminated.

Whether the preservative liquid invented by M. Rodet acts as a co-



agulant or as a caustic, is not a question for us to decide. The following formula has been adopted as the best, after long trials:

R. Pure water..... 24 grammes (370 grains).  
 Perchloride of iron, liquid, at 30°... 12 grammes (185 grains).  
 Hydrochloric, or better, citric acid.. 4 grammes ( 61 grains).  
 M.

We cannot now enter into the details of the great number of experiments which have been made in the hospitals of Lyons; but we should add, that the results are nearly constant, and seem to show that the Rodet liquid possesses the power of neutralizing the virus of syphilis introduced by inoculation, and of preventing the development of consecutive accidents. We will add that the same effects have been observed with vaccine virus.

But will these preservative powers act with equal certainty when the liquid is applied after the sexual act? Certainly, the results thus far are adapted to give rise to hope; but, on the other hand, it would be a rash thing, in so grave a matter, to utter our judgment before a long and severe trial had been made. Besides, in this case, the value of the remedy is not the only point in question, and success must depend on many considerations of quite another nature.

The method of application, as given by the inventor, is as follows:

As quickly as possible, after the suspected coïtus, the part is washed in water, to which is added the preservative liquid, in the proportion of one tablespoonful to one or two glasses of water. Charpie, or linen, soaked in the pure liquid, is immediately laid on the part supposed to be contaminated, and allowed to remain for a quarter of an hour, care being taken that the liquid penetrates all the folds of skin and mucous membrane. During this application, an injection of the aqueous mixture above mentioned is to be made. Finally, the parts are washed in cold water.

Doubtless this proceeding is easier and more certain in men than in women; yet it is applicable to the latter, in the form of injections of the mixture into the vagina, or, of applications of the pure liquor on a piece of linen held between the labia majora and minora.

But even if our enthusiastic expectations are not all realized, and the hope of the final suppression of syphilis in a future day be only a beautiful dream, M. Rodet will certainly have rendered a signal service to humanity, if, thanks to the preservative and to the system of precaution which its use requires, even a considerable diminution of the chances of contamination should be attained.

We ought to add that M. Rodet proposes his "liquide chloruro-ferrique" not merely as a prophylactic against syphilis, but as a cure for the same disease. According to his experiments, the liquor modifies simple and even indurated chancres with truly remarkable rapidity,

sometimes arresting in twenty-four hours the power of secreting virulent pus.

Assuredly these results are worthy of all the attention of physicians, and we wish with all our heart for their confirmation.

This application in syphilis has naturally been followed by a similar treatment of other virulent diseases. M. Rodet, assisted by his brother, a distinguished veterinarian of Lyons, has made a series of experiments with the object of destroying the virus of rabies and of glanders introduced by inoculation, and he seems to have obtained quite conclusive results with his liquid.

But as regards hydrophobia, prudence directs a reserve of opinion; until the demonstration is complete, it will be better to first burn the bite with red-hot iron, and afterwards, if there is opportunity, the liquid may be made to penetrate the remoter parts of the wound, which the iron could not reach.

We shall further mention the application of the preservative to poisons, especially that of the viper; but it is plain that success must depend on a very speedy application, on account of the exceptional rapidity with which absorption occurs.

The chances of success will be much greater in the case of bites of gnats, wasps, bees, etc.; it cannot be too highly recommended in the bites of certain flies which so often, in summer, occasion charbon.

The preservative liquor is specially recommended by Dr. Pétrequin, in dissection wounds.

*Internal use.*—Great as has been the extension of the external use of perchloride of iron, its internal use has been equally enlarged.

Its usefulness as a hæmostatic naturally suggested its application to the treatment of internal hæmorrhages. It has in fact been used from the first, in hæmoptysis, gastrorrhagia, and certain intestinal hæmorrhages.

The results obtained in these various cases were often good, but they were improved when the time for administration was better understood; this should be as distant as possible from the hæmorrhagic molimen, especially in active hæmoptysis.

By degrees the remedy has been applied in most of the great internal hæmorrhages, and it is now daily given in metrorrhagia, whether essential or symptomatic of various organic lesions. In all these it is very useful.

We can say as much for leucorrhœa, blennorrhagia at the period of decline, and a great many affections of the mucous membranes which are accompanied by bloody or mucous fluxes.

We have successfully used perchloride in certain cases of severe dysentery, at an advanced stage, when all ordinary means had entirely failed.

The perchloride has particular efficacy in purpura, whether of the variety simplex or hæmorrhagica.

A distinction is to be observed in regard to purpura simplex. Accord-



ing to M. Devergie, if it presents irregular plaques, diffused, always quite large, especially if its progress is continued and progressive, the perchloride rapidly cures it. If the spots are generally lenticular or petechial, quite circumscribed, and appear in successive crops, the case is otherwise, and the effect may be to shorten each attack a little; but it does not prevent relapses or further crops, and in fine exercises but a very slight influence upon the mode of development and the total duration of the disease.

In purpura hæmorrhagica, on the contrary, a deeper and more serious affection, characterized by hæmorrhages from various mucous surfaces, the perchloride possesses great power. In this respect the observations of M. Pize of Montélimart, and a certain number of other practitioners, seem very conclusive.

Yet it would be a grave mistake to attribute infallibility to the remedy, on account of its successes. For the disease, though putting on the same form, may have radical differences; and further, it often gets well with marvellous rapidity, whether a certain treatment be followed or no; and often, on the contrary, it goes straight on to a fatal end. We require no facts to show the inefficacy of the pretended specific in these refractory cases.

Being a martial preparation, the perchloride naturally has some use in the treatment of anæmia and chlorosis. At the close of the last century, it was combined with Hoffmann's solution, and enjoyed, under the name of Bestuchef's tincture, a great reputation, being thought to work wonderful cures, as a tonic and antispasmodic. Recent trials have shown the efficacy of the preparations of perchloride of iron in affections marked by impoverishment of the blood. In its double form of reconstituent and astringent it seems to me that it ought to find a special indication in menorrhagic chlorosis. Thus it will prove of special use to a certain number of young girls just beginning to menstruate, in whom the first periods are real hæmorrhages.

Under these conditions, we have more than once had occasion to observe good results from the employment of the solution, during the hæmorrhagic crisis, with cinchona powder in the intervals, as a means of rendering the new function regular at its outset, and of preventing subsequent fresh accidents.

We have now to speak of the use of perchloride of iron in diphtheria. On account of the special interest of this question, we shall dwell upon it at some length.

Dr. Aubrun is entitled to all the credit of originating this treatment. Our respected confrère, thanks to the skill and perseverance with which he has pursued his course of experiments, has developed a complete new method of treatment in croupous angina, which may have its future.

The method is as follows:

If diphtheria of the pharynx exists from the outset, we begin by touching the back of the throat with a sponge dipt in an aqueous solution

of perchloride of iron of various strength. The liquor of Dr. Rodet may deserve preference. The operation is immediately followed by increased ease of breathing, due to removal of the false membranes from the pharynx; and at the same time it acts as an alterative upon the affected parts. It will be necessary to repeat this several times, according to the severity of the local affection, and especially, according to the ease with which the false membranes are detached.

Contrary to general opinion and practice, M. Aubrun assigns only a very secondary place to topical applications, and hardly insists on their use; but we cannot share this view, which is too exclusive. He considers that all, or nearly all the treatment consists in the internal use of perchloride of iron.

He attaches great importance to the method of administration. If the patient is a child, 20 drops of perchloride liquid at 30° are placed in a glass of cold water. Of this, the patient drinks a swallow (about two teaspoonfuls) every five minutes while awake, and every quarter of an hour during the time of sleep. Immediately after each swallow, the child is made to swallow a mouthful of cold milk, not boiled, without sugar.

M. Aubrun advises that this treatment be continued with scrupulous regularity several days in succession, without pausing during sleep in the first three days, at least in very grave cases. His reason for this persistence is, that the false membranes do not usually begin to soften and fall off before the end of the third day.

It is necessary to take the precaution of giving the solution in a glass or porcelain cup, and not in a metal spoon or vessel, in order to prevent decomposition. It is also necessary to avoid all drinks, medicines or foods which might effect this decomposition, and more particularly those containing tannin. In fine, the treatment for the first four or five days is almost wholly confined to the solution of perchloride, which varies from 20 to 40 drops to the glass of water (according to the patient's age) and to cold milk. In general the patient takes, every 24 hours, from seven to ten glasses of the solution ( $1\frac{1}{2}$ —2 litres = 3—4 pints), and nearly as much milk, making from 140 to 360 drops of the perchloride in 24 hours. M. Aubrun advises that the treatment be commenced as soon as possible after the outbreak of the diphtheritic affection, in order to arrest its progress more surely.

In support of this new treatment M. Aubrun presents the following results, all taken from his own practice:

During three years he has employed it upon 39 patients, of whom 35 were cured—2 with tracheotomy. The cases are classified as follows:

25	affected the pharynx from the outset.....	25	cures.
5	“ pharynx and skin from the outset.....	5	“
9	“ the pharynx and larynx; { 3 from the outset.....	3	“
	generalized; severe; { 6 at an advanced pe-		
	riod .....	2	“



The two last cures were obtained by tracheotomy (*Union médicale*, 22 décembre, 1860).

These are certainly most remarkable results, which must prepossess us in favor of the new system.

The same treatment has been used by others, both in Paris and the provinces, and several have had good results. We add that one of us very lately employed it very successfully in the case of a little girl, severely affected.

After M. Aubrun, we will specially cite M. Isnard of St. Amand, as having given most attention to the subject. In our opinion, this gentleman deserves the credit of having very clearly grasped and very judiciously estimated the mode of action of the perchloride.

M. Isnard sums up the action of perchloride of iron as follows:

1. Action on the blood, the fibrino-albuminous elements of which it renders more plastic, and prevents their transudation through the respiratory mucous membrane; or later, in infectious cases, through the walls of the uriniferous tubules, cutaneous wounds, the serous membranes, etc.

2. Action on the respiratory mucous membrane, the fibrino-albuminous elements of which it also renders more plastic, and contracts the organic frame-work. Thus the mucous membrane becomes incapable of being traversed by the albuminoid principles of the blood.

3. Tonic corroborant action upon the nervous system, the essential action in the view of most physicians; unquestionable, but of very secondary importance in the direct treatment of croup.

Resting upon the results which have been already gained, and perhaps still more upon the argument drawn from this triple influence, M. Isnard does not hesitate to consider perchloride of iron our hope in croup, and in some sort its specific cure. He explains, however, his view as to specificity. Perchloride of iron is not, he says, an anti-diphtheritic specific in the full acceptation of the term; but it prevents the intoxication. It does not destroy existing infection, but it arrests it in its increasing progress, and thus gives to the organism the faculty of reacting, of throwing off the toxic principle by its own forces and the natural emunctories (*Union médicale*, sept., 1859).

This interpretation is not quite complete, but seems to us rational and true; at least, it has the merit of giving the living organism its fair dues, in a special question of therapeutics where modern chemistry considers itself alone entitled to interfere, and vitalism quite out of court.

We should mention a similar attempt, previous to M. Aubrun's, in which the perchloride was used in a purely topical manner. We refer to the distinguished Dr. Jodin of Paris, who, having followed the studies of M. Bazaine on tinea, struck with the contagious property of the false membrane, asked himself whether the latter might not be wholly composed of a parasite.—He found spores and parasitic tubes in the false membrane of the throat and trachea; but, though the fact is correct, it is to be feared that the interpretation is wrong, for he himself candidly

states that he found the same parasites in the mouth, even when the patients were affected with other diseases. It follows that these spores are no more characteristic of the false membranes than thrush is of phthisis.

The useful point in Jodin's observations is, the great utility of local cauterization of the false membranes. It is only necessary, in order to make this effectual, to press upon the false membrane in order to saturate it well, and cauterize it in its entire depth.

This treatment has been since employed with success by Courty ("Recherches sur les conditions météorologiques et le traitement de la diphthérie," Montpellier, 1862), and by M. Leroi, of Château-du-Loir (*Union médicale*, 1860).

Very recently a naval surgeon, Dr. Noury, has confirmed these results by the cure of twelve out of thirteen patients with angina diphtheritica. He reports that Dr. Cuneo, at the port of Toulon, has more than 20 similar cures. These gentlemen carried the doses up to 10 grammes (154 grains) per day, even in a child of 5 years (Noury: *Thèse de Paris*, 1872, No. 62).

In fine, while acknowledging the first successes of the new treatment of diphtheria, we must leave to time the duty of giving final judgment.

### TONIC TREATMENT IN GENERAL.

We shall see alterative medicine hindering or destroying the action of the plastic force, opposing the reparative changes of living chemistry by weakening the nutritive properties of the blood and the tonicity of the solids. Tonic medication has an entirely different object; it restores the tonicity of the tissues, reconstitutes the assimilative functions, and imparts vital resistance to the system.

If we consider the organic actions directly affected, we shall soon find that they are the most important, the most radical in the system, and the basis of animal life. They are found in the lowest and simplest of animals, as complete, as perfect, as well marked in essential points, as in the highest animals, or even in man.

As observed in animals which consist of a formless parenchyma containing an alimentary sac without any other special organ, the actions here considered comprise essentially: 1, an areolar circulation which requires two conditions, viz.: an organizable, assimilable liquid, and a solid matter possessing a certain orgasm or tonicity, which enables it to react against the impression of the liquid, its normal excitant, so as to perform obscure movements in various ways (capillary or interstitial circulation); 2, identification of an assimilable liquid with the assimilant solid (nutrition); 3, the formation at the point of contact of these two elements, of a new product (secretion), which, not being further required as a part of the creature, is soon eliminated (excretion); 4, the production of a special temperature (calorification).



This extreme simplicity corresponds with the simplicity and homogeneity of the composition of these animals, which consist only of cells which are nearly alike. Living chemistry had few combinations to make in forming a single substance, the least animalized in the scale of tissues. This is why these animals contain no elaborating organs, viscera, for preparing the food and rendering it fit to repair the organized matter.

But in higher animals, mammals, and man especially, to whom all that we are now to say relates, the system of nutrition is infinitely complex.

In finishing the animal, nature has reached the highest degree of organic perfection, which consists in the summum of development of the organs which place it in relation with all other beings. The instruments of this "life of relation" are the cerebro-spinal system of nerves and the locomotor muscular system, both formed of the most composite and the most animalized tissues in general anatomy, albumin and fibrin.

"The animal lives for the nervous system," says a great naturalist. We shall deduce from this profound saying the fundamental principle which we think ought to guide the pathologist in the philosophic study of tonic medicine.

In man, a series of instruments or organs called viscera (from *vescor*, I am nourished) stands between the food and the organized matter, the function of which is to give to the food a series of modifications which assimilate it to the substances which it is to form or support. Another series of organs has the object of elaborating, not reparative substances, but the unassimilable parts of food, and the substances which, used by organic movement, and super-animalized, are to be rejected. Thus, between the ingesta and the fixed animal matter, there is a series of assimilant or composing organs; between the fixed matter and the excrements, a series of depurative, disassimilant, decomposant, excretory organs. This constitutes the nutritive system, the organic life, in man. This complexity is necessary, in order that the alimentary material may pass gradually into a state of animalization such that they may replace the various components of the human body. In the last analysis, all these preparatory operations of vital chemistry, acting through the viscera of assimilation and disassimilation, do nothing but prepare the formation of the organs of the life of relation, to wit, the cerebro-spinal nervous system and the muscular system which is subject to it.

But a spinal nervous system is required to animate all these organs and co-ordinate their functions. These functions seek one end by various means; they require an influence to distribute to them such degree of sensibility as may place them in connection with their special stimulus, and may cause in them the movements necessary for transporting nutritive and effete materials; an influence which may insure the unity and regularity of the operations, and which, establishing a correspondence with the sensible centre, the brain, may inform the animal of his needs, and urge him by irresistible instincts to procure food. This nervous system is called the great sympathetic or trisplanchnic.



Three chief things are to be considered in the nutritive system of man, which is called by Bichat the organic, interior, or hidden life of man. These three are of much importance in relation to tonic medicine, and are:

1. The fixed and solid animal matter, organic tissues, parenchyma, etc.; 2, the liquid animal matter from which the solids draw all the elements of their development, maintenance, and repair; 3, the nervous system which animates and co-ordinates the functions of the viscera which form blood and remove the residual and effete matters.

Let us apply these physiological facts to the study of tonic medication.

1. We have seen that the organic tissues, in order to receive the impression of the nutritive fluids circulating in their interstices, need a certain power which shall enable them to react on these fluids and give them the oscillatory movements which constitute the areolar or capillary circulation, and shall also give them a vital affinity for the circulating fluid, to enable them to borrow from it the molecules needed for its sustenance; that is, a power of assimilating the fluid.

This important faculty has always fixed the attention of physiologists. Stahl, who was greatly interested in it, gave to it the government of many physiological and pathological acts which do not belong to it; he called it tonicity or tonic movement (from *τόνος*, tone, tension, rigidity). "*Motus vitales æque parte animales uti ante omnia supponunt sufficiens robor in ipsa parte, quod, quia in certa tensione consistit, propterea tonum appellare soleo, et maximo merito MOTUM TONICUM*" (Stahl: "*Theor. med. ver.*," p. 647). Bichat, decomposing the properties of this force, gives it the double name of organic sensibility and insensible organic contractility. Lamarck ("*Philosoph. zoolog.*") speaks long and very well of it, denoting it by the word *orgasm*, which in fact seems to us very exact. Broussais ("*Physiol. appl. à la pathol.*") calls it vital erection, and his study has given him material for admirable developments.

Recent biological experiments (which throw so great a light on all which concerns physiology, and even pathology) have shown by the labors of Prochaska, Legallois, Marshall Hall, Joh. Müller, Claude Bernard, etc., that this tonic action originates in the sensitive nervous terminations, passes to the medulla, and returns thence to the same or another point as a motor excitation, whence the epithet *reflex* is given to this action.

The anatomical base of this act was discovered, in 1853, by Schroeder van der Kolk, at Utrecht, and Wagner, at Göttingen. The posterior roots of the spinal cord furnish one group of ascending fibres which go to the encephalon, a second which loses itself in the posterior cornu, and a third which passes from behind forward through the entire thickness of the cord and goes to the groups of large motor cells, and thence to the motor nerves (Jaccoud: "*Les paraplégies et l'ataxie du mouvement*," 1864).

M. Claude Bernard has further shown that the excito-motor arc does not necessarily pass through the cord, and that a ganglion of the great sympathetic may serve as a centre of reflex action. He has demonstrated this upon the submaxillary gland.



This established, let us add that certain very grave morbid conditions are specially characterized by a loss or considerable enfeeblement of this faculty, a sensible relaxation of the tonicity of the living tissues; the sensibility and the insensible contraction of the parenchyma—to use the words of Bichat—are so languid and lose so far their affinity for the blood and other liquids, their normal stimulus, that the affinities of vital chemistry are no longer set in action. In these affections the capillary circulation is slow and imperfect, and the liquids are as much under the control of gravity as of contractility. They escape through the exhalants, transude by the pores, spread over the surfaces, or are extravasated in the cellular cavities, etc. These accidents are the predominant ones; their indications are the most pressing, often the only ones. There is a class of tonic agents suited to combat these accidents and fulfil these indications; these are the tonics, properly so called, in the strict etymological sense (τόνος, tension).

Some writers on materia medica exclude these from the general class of tonics, and place them apart as astringents. We prefer to follow Cullen and others, who place them among tonics, under the name of astringent tonics.

Thus, tonics in general are divided, firstly, into astringent tonics, which give to the solids, directly, the tone, orgasm, vital density, needful for the performance of their insensible actions.

2. The blood, the internal source of supply whence the solids draw all the elements of development, sustenance and repair, in order to possess these qualities, must convey a sufficiency of nutritive particles, of liquid flesh, in a word, of fibrin, albumin, globules, etc. There are diseases specially characterized by an insufficiency of the elements, which give rise to a great variety of the severest symptoms. The most important indication is to restore to the blood its nutritive qualities as soon as possible. The remedies which effect this are called analeptic or reconstituent tonics (from ἀναλαμβάνω, I re-establish).

The second division, then, consists of analeptic tonics, characterized by restoring immediately to the blood the organizable and reparative principles which are lacking.

3. Lastly, the nervous system which animates and co-ordinates the functions of the viscera which form the blood, remove residuary and effete matters, and preside over generation, the ganglionic system, in order to perform those important functions, needs energetic, persistent, active, constant and profound energy, and especially, perfect harmony of action. This system governs the phenomena of animalism. It regulates all the instincts, all the phenomena of vital synergy, of general reaction, of the vis medicatrix, of physiological resistance—in a word, all those great phenomena on which rest health and the symptoms in disease. The principal centres of this apparatus are what has been designated by turns the *ἐνερμον*, the duumvirate, the archæus, the impetum faciens, the vital tripod, etc.

Every considerable disease has its echo in this system. It is usually



affected indirectly. In certain cases it is attacked partially and primarily; with these we have not to deal. But certain other causes strike directly the chief foci of this system, and tend to extinguish organic life in its animating centres. Then we see all the great functions of the economy fall into sudden collapse and incoherence; strength and harmony are broken, the synergies impotent, vital resistance blasted, the principle of existence directly threatened. These are the malignant, pernicious maladies, etc. We then need, to save the life which is ready to flee, heroic remedies, which do not require to excite one or several physiological modifications before their effect is produced, but go straight to the point of danger, attack the enemy body to body, as Galen says, and throw him violently; or rather, which resist with energy, and support the nervous system in its reaction against the fatal influence of certain causes or morbid germs. The last class of tonics includes these potent antagonists, which we will name neurosthenic tonics.

The third division, therefore, consists of neurosthenic tonics, characterized by conferring vital resistance immediately upon the living forces of the animal system, and by re-establishing its synergies.

Independently of these special and distinct effects, the above classes of remedies have a tonic action in common, resulting from their usual mode of administration. All of them, when placed in the stomach, are stomachics, excepting some of the first class; and the restoration of digestive power, insuring good material for repair, is certainly a leading and very powerful sort of tonic action. And who does not know that the physiological influence of a stomach, which is happily at work, pacifies and consoles the whole system, giving a proof that force and harmony are there, "pylorus rector" (Van Helmont)?

The study of remedies has two parts: 1, that of the physiological or immediate action of a class of remedies; 2, that of the indications or contra-indications for producing this action in given diseases.

We will resume the study of tonic medication in general upon this plan.

*Physiological or immediate action of tonics.*—In order to understand the immediate effects of a remedy they must be observed in a person in a state of perfect health, whose organs are all in equilibrium and possess their vital reaction. If we recall what was just said, and define tonics in general as remedies capable of restoring energy to the functions of organic life directly and immediately, we shall soon see that they do not possess a physiological action differing from their therapeutic one. Observe, also, that we do not say that they give, but that they restore energy to these functions. How could energy be given to the nutritive functions of a man who lacks no energy? In order that the effect of tonics should be marked, the function must first be feeble and stand in need of restoration.

Properly speaking, there will be no physiological action. Let us explain. A mustard foot-bath is prescribed in active congestion of the



brain. The redness, pain, congestion, in a word, irritation of the feet, form the physiological action of the bath. If the congestion of the head is arrested by the effect of the mustard, that is, by the revulsive irritation of the limbs, the therapeutic aim is attained. It is very important to note the distinction between the two, for the former may easily exist, and unhappily does often exist, without the latter: whence the great uncertainty of therapeutics. When a remedy possesses all its physical and chemical properties, is in good condition, is given in fit doses, we generally get from it the physiological action of which it is capable. It is far from being so with the remote, mediate, or therapeutic action. The curative effect is always preceded by a vital action kept up by the remedy, to which we apply the name of immediate or physiological effect.

This effect sometimes appears in other organs than those which require to be affected, and it then appears distinct from the remote or therapeutical effect. At other times the remedy has its special influence directly upon the vital acts which are aimed at; in this case the immediate or physiological action seems to be confounded with the remote or curative effect. But in reality the two orders of effects always exist, and the second, the one desired, is always indirect, that is, the product of life modified by the remedy. There exist no specifics in the sense of the Galenists and of humoral medicine. The medicine either acts on the affected organ, and is direct, or upon a different one, and is indirect. In both cases the malady is never modified except by the intervention of a physiological action.

To this, finally, does the division into rational and specific treatment come, which, we repeat, is only a Galenic subtlety.

All writers on *materia medica* have assigned to tonics the character of acting insensibly, gradually, and of imparting to the vitality of the organs a durable energy. Upon this fact they base the distinction between tonics and stimulants; the latter acting promptly, vigorously, and with an evident vital exaltation, which is unmistakable, though very transient. These facts are a proper basis for drawing a natural distinction, but we may go further, and ask for the reasons for this difference.

Several illustrious physicians of the school of Montpellier, Barthez and Dumas in particular, have admitted two species of forces in the system—the acting forces, in *actu*, and the radical forces, or in *posse*, a distinction already pointed out by Galen.

Since an understanding of this distinction is indispensable in order to grasp the action of the most important tonics, we shall leave to Barthez himself the task of stating it; we shall develop it when applying it to special classes of cases.

“We ought not to regard the system of the forces of the vital principle as we do those of the mechanic forces. This error produces an infinity of others, in the science of man and in practical medicine.

“A system of mechanical forces includes only determined forces which act at a given time to produce equilibrium or sensible motion.



“But among the forces of the vital principle we must distinguish the forces which this principle causes to act at each moment in all the organs, from the radical forces, or those which have the power to sustain the acting forces in their task.

“The aggregate of the sums of these two sorts of forces forms that which I call the entire system of the forces of the vital principle.

“No doubt it is hard for us, with our mechanical notions, to imagine a sort of forces which are absolutely radical or potential.

“But in support of this distinction, which I am the first to propose, I remark that it has always been presupposed, although in an implicit and extremely vague way, since it has always been said to be very desirable in medicine to distinguish the oppression from the resolution of forces.

“We can form no idea of the latter distinction except as we suppose that radical forces exist, which are either merely oppressed, or are resolved (destroyed) in the various cases of enfeeblement of acting force.

“The forces acting in the organs originate in the radical forces, which are distributed to each organ in accordance with unknown primordial causes, or with causes extrinsic to the living body, which act in a manner only known to us by observation.

The primitive energy of the radical forces is doubtless different in each man from birth, and is susceptible of continual increase and decrease.

“The increment is effected directly by the action of various fortifying agents which may bear immediately upon these forces. Some fortifying agents, such, for instance, as cinchona, may naturally increase the radical force of the vital principle directly; and poisons may, equally naturally, attack and destroy directly these radical forces.

“But the increments of radical force, which are indirectly produced by an exercise of the function which is conformable to health, are of principal importance. They always exist in a ratio compounded of the intensity of action displayed by the acting forces in each of the principal functions, and of the preservation of the balance of activity among the functions, which habit has established in that form of health which is peculiar to each individual” (Barthez: “Nouv. élém. de la sc. de l’h.,” t. II., p. 163 et seq.).

The true tonics, which directly restore the functions of vegetative life and impart vital resistance to the nervous system, bring their influence to bear, immediately, either on the radical forces to increase them, or on the acting forces to fix them and increase their resistance and vigor. To use an expression, of which the energy, conciseness and picturesque vigor betray its source, they make force, they fix the state of the body, “*vim porro habent hæc medicamenta ut epotis his CORPUS IN LOCO SIT*” (Hippocr.: “De affect.”).

It is then quite plain that they can have no action upon the healthy and robust man, which can enable us to prejudge their therapeutic effects. The tonics we are now considering are those of the second and third



class, the analeptics and the neurosthenics. The former build up the blood directly, the latter by directly imparting vital resistance to the animal frame. A man in full vigor of function will not be built up by analeptics, because his blood is already rich. He cannot go further without endangering it, nor recede without impairing the assimilative force which is in its highest condition of activity. This has been well expressed by the immortal author of the Aphorisms as follows: "*In gymnasticæ disciplinæ deditis, boni habitus ad summum progressi periculosi, si in extremo steterint; non enim possunt in eodem statu manere neque quiescere. Quum vero non quiescant, neque ultra possint in melius proficere, reliquum est ut in deterius ruant. Horum igitur causa, bonum habitum solvere confert haud cunctanter, quo rursus nutritionis principium sumat corpus, etc., etc.*" (Hipp.: "Aphor.," sect. i., aph. 3).

If we give to this vigorous man the analeptic tonics, including preparations of iron, the broths and gravy of dark meat, fibrin, osmazome, and all the substances which are strongly nitrogenous, and if he takes no food except these, combined with preparations of iron, he will soon be plagued with symptoms of plethora; then in succession, with indigestion, with phlegmasias, hæmorrhages, excessive diminution of all the secretions and exhalations, gravel, gout, then debility, obliteration of the intellectual, sensory and motor faculties, and lastly, indirectly, remotely, colliquation and marasmus, etc. The physiological effects of such remedies require, in order to become therapeutic effects, to be developed in persons of weakened assimilative power, or whose blood has lost part of its reparatory elements; for in well and strong persons these physiological or immediate effects, far from benefiting health, would only beget morbid symptoms. So true is it that a rigorous classification of medicines is impossible, and that, according to the dose and the condition of the subjects, they possess different, and sometimes opposite properties.

If possible, the neurosthenic tonics are still more destitute of a physiological action in health which could lead us to infer their action in disease. This is evident as soon as we name them—the bitters, and cinchona at their head. To display their power they must attack a disease or an enervated organism. How can they impart vital resistance, where this faculty is not impaired? But give them to persons in whom this resistance is weakened, threatened, whose synergies are broken, discordant, and we shall see how surely and promptly the organism will rise and resist the morbid influence.

As to the astringent tonics, they form an exception to these laws. They always act through tangible physiological phenomena, producible on health, independently of those changes in fibrillar tonicity which form the object of their beneficial action. They are, therefore, rather tonics in the etymological than in the medical acceptation of the word. We have classed them with tonics for this reason, and also because they may fulfil special indications in reconstituent medicine, and thus become true tonics.



We think that they may act on that which Bichat calls the properties of the tissues, as distinct from vital properties, because they persist after death. The astringent tonics may exhibit their corroborant and tanning action upon tissues deprived of life. It is thus that they are useful, and affect immediately the vitality of such tissues.

The tonic influence exercised by these three classes, especially the irons and the bitters, through their stomachic action, is obtained by physiological effects, which may to some extent be seen in a well person. In such a subject, the appetite and digestion may be excited and accelerated, but the appetite will soon fail, and digestion become painful and disturbed. When given to fulfil good indications, and solely to relieve the digestive functions, their effect will be more pronounced and beneficial. In spite of the assertions of some authors, their stomachic virtues play but a feeble part when they are required to aid in directly restoring the blood, or to uphold by an instant support the vital resistance which is on the point of sinking.

The distinction between tonics and excitants is now clearer.

Stimulants give more energetic play, they increase and expend the forces actually (in actu) at the disposal of the system. Tonics increase, raise, repair the forces which the system may use—the radical forces. The former have a very manifest and constant action independent of morbid states, because the system may always hasten the expenditure of its acting forces, and exhaust the vital movement; but it is impossible for a man to increase the sum of his vital forces when they have all the physiological power which his constitution admits of. The more vigorous and healthy a constitution is, the more will stimulants act on it; the more food for excitement will it be able to furnish. On the contrary, the more vigorous and healthy an organism, the less capable of an increase of radical force through the action of tonics, which are only able to repair where loss exists.

The promptitude, vivacity, and briefness of the stimulant action, compared with the insensible slowness, the silence and permanence of the tonic, are an obvious consequence of what we said at the beginning of this section upon the obscure tonic movements of the tissues, the radical forces of the system, and the vital resistance of the nervous system.

The physiological stimulants of the acting forces are constantly producing a loss of radical force, which has to be repaired by the physiological tonics. These stimulants consist of motion, exercise; the waking state, and all the locomotive, intellectual and affective acts which fill it; the physiological tonics are food, sleep, rest of the organs, and that conservation, of which Barthez speaks, of the balance of activity among the functions, which habit has established in the form of health which is peculiar to each individual.

But in extra-physiological states, in certain diseases, the reactions of the acting forces sometimes require to be called out, or sustained, while



physiological stimulants are no longer suitable. Therapeutical stimuli are then in order. We shall speak of them in another place.

In other morbid states, the radical forces require to be fixed or brought back to their normal energy or resistance, and the use of physiological tonics is unsuited to the circumstances. Then it is that therapeutical tonics are of use.

Having now studied abstractly each of the forces which combine for nutrition, we ought to add that these three are solidary, inseparable, and in reality cannot act nor be modified independently of one another. They do not rationally exist except in concurrence. One of them supposes the other two, represents them in its way, and necessarily includes something of them. This is why every hygienic or therapeutic modifier acts, not solely on the specially correspondent force, but on all three forces. It acts, however, on the others only indirectly and by means of the force with which it is most directly related. It follows that when we say that iron acts on the vascular system as a direct inciter of hæmatisis, cinchona on the nervous matter of organic life as a radical fortifier, rhatany on the framework of tissues as a primitive tonic and roborant, we do not exclude the indirect actions which these remedies may have, the one on the nervous matter and the organic framework, the second on the framework and hæmatisis, the third on the latter and on the nervous tissue. Just as these three elements mutually interpenetrate, to form an indivisible unity of organism, so the three tonic properties are intimately combined in each of the three groups of remedies; only, each group bears the name of its leading quality. Iron has distinct astringent and neurosthenic properties, but the former are less marked than those of alum or rhatany, and the latter less certain than those of cinchona. Catechu is an astringent, and a stomachic or neurosthenic of the stomach. And cinchona, quassia, etc., are plainly roborants or tonics to the tissues.

It is understood that these generic analogies permit each species of the genus, each individual of the species, to possess its own individuality.

Thus, in spite of their analogies, iron and cinchona are mutually distinct. Both are tonics, each in its own way.

#### ANALEPTIC OR RECONSTITUENT TONICS.

This first category includes only iron, and perhaps manganese, according to the recent studies of M. Pétrequin of Lyons. Certain substances, as fibrin of dark meat, broths, raw flesh, maltine, pepsine, and proteine, might be added, as containing a great amount of analeptic principle in a small bulk, and as being the most restorative of all alimentary substances. For these properties they are often prescribed as remedies, not only to nourish and repair the body, but to combat a certain order of morbid phenomena. They are thus the most potent succedanea and the best



adjuvants of the action of iron, the only analeptic tonic in the *materia medica*.

The blood must be impoverished in order to derive benefit from iron. Many and various are the diseases which give rise to this state. In our time they are often not recognized unless they are so well marked that it would be impossible to mistake them. But these are not the only cases in which a multitude of functional lesions spring from lack of energy and proportion among the assimilative functions, and in which the leading indication is to increase their activity by analeptic tonics. We shall here discuss some points of physiology and pathology which are necessary in order to appreciate the indications for these remedies.

There is, perhaps, in physiology, general pathology, practical medicine, no greater and more fruitful fact than one which is found in several places in Hippocrates, to which the great man returns with a satisfaction which shows how wide a place he assigned to it. What breadth in the simple words, *SANGUIS MODERATOR NERVORUM*! How directly does it bear its fruits, when Hippocrates deduces that inference, so true and so broad, that it is hard to say which of the two, the inference or the former observation, is the principle, and which the application—*FEBRIS SPASMOS SOLVIT*. It is the same law interpreting other facts, when he states that the blood is a soporific, "*sanguis somniferus*;" that it gives wisdom (*i. e.*, harmony, connection, solidity of intellect and morals), especially when it has its normal density, "*sanguis ad sapientiam facit præsertim quum suam habet consuetam concretionem*;" that on the contrary, when too liquid, it produces unreason, "*sanguis ad insaniam facit quum sit nimis dissolutus*," etc.

These capital propositions govern a whole class of affections of the nerves, as we shall see.

Is not this something most worthy of the meditation of physiologists and the attention of practitioners, this perpetual antagonism between blood and nerves, between the predominance of the assimilative and that of the nervous phenomena; giving rise to the fact that, the more development and activity the sanguineous system and the plastic force possess, the more fixed, silent, regular, co-ordinate are the nervous acts; that, conversely, the more poor and feeble are the nutritive and vegetative functions, the more blood is diminished in quantity and despoiled of its organizable parts, the more mobile, exalted, irregular, are also the nervous forces? The silence of the nervous phenomena shows no weakness, for force and power arise from harmony. Exaltation and mobility are anything but tokens of force, for throughout the organism, weakness arises from disorder and want of harmony.

The simplest observation of man in health and disease affords abundant attestation of the truth of this law, laid down by Hippocrates for the first time, and one might say for the last, if Sydenham had not found the facts on which it rests in nature, rather than in the works of the Father of Medicine. These facts were his torch in that little treatise on hysteri-



cal disorders, which forms part of his letter written to William Cole (Sydenham: "Op. Méd.," tom. I., p. 266), an admirable masterpiece of observation and practical medicine, which, in spite of the opinion of an excellent writer (Dubois of Amiens: "Hist. philos. de l'hypocond. et de l'hystér.," p. 370), we regard as constituting one of the best titles to his glory. We are proud of being the first to resume these ideas since Hippocrates and Sydenham. On the subject of antispasmodic treatment, we have taken them as our guide in laying down the radical treatment of essential diseases of the nerves, of which the antispasmodics were but palliatives. It is time to give currency to ideas too much neglected, which, we venture to say, form the secret of treating many spasmodic affections and neuroses.

*Ars, imitatio naturæ.*—Upon this principle rests Hippocratic medicine. Our task should be to learn how nature departs from her physiological state, on what essential conditions this state depended while it was maintained; then, by what paths, by the aid of what circumstances nature returns to order and equilibrium. If, after this, we find that in cases where nature cannot restore herself, art or therapeutics can, by imitation, do that which the organism in other cases can do of itself, we shall have shown the true sources of the curative indication in an important class of diseases.

There is an ancient division of the organic functions into the vital, comprising respiration and circulation, because these functions are vital par excellence, and immediately necessary to life; and the natural, comprising digestion with its adjuvant acts, and generation, because nature has placed in animals invincible instincts which lead to the maintenance of life and the propagation of the race. There is a nervous system which presides over these, and which co-ordinates their functions and those of animal life. We stated the attributes of the trisplanchnic system at the beginning of this section. We now add the physiological consequences of these attributes, a subject to be resumed under Antispasmodic Medication.

The leading characteristics of the great sympathetic nerve are: 1. Incessant continuity of action; the functions of life are directly under its keeping, and if it suspended its action life could not be maintained for an instant. 2. Complete silence in action, dumb concentrated activity entirely without the cerebral consciousness. The more regular, energetic and salutary this action is, the more it ought to be remote from consciousness; this is the stamp of robust and complete health. 3. Power to force and subdue the will invincibly, to control the locomotor system and all the apparatus of relation by making the brain its own servant or agent; a capital fact, forming the domain of instinct and the passions. 4. Nullity of cerebral influence upon the phenomena which are wholly dependent on the action of this system.

Recall, now, that whatever leads the trisplanchnic system from the performance of its due functions, produces what is called nervous disease—



nervousness, spasms. We shall speak further of these under Antispasmodic Medication.

The conditions which give rise to the nervous state may be classed under two general heads: 1. Causes which strike the ganglionic system directly, and, so to speak, snatch from it its natural functions. Among these, in the first place, are the passions, the strong affections of the mind; next, certain morbid principles like that of gout or rheumatism, etc. We have nothing to do with this class. 2. Causes which affect the ganglionic system indirectly, removing it from its duties by removing the object of its activity, to wit, the food or the blood. The visceral innervation, having then no object, unable to use its activity in a normal and regular way, excites a thousand disturbances consisting of morbid sensations, vicious and disorderly movements. This class is more powerful and more fruitful; we shall dwell on it, as furnishing the most important indications for analeptic tonics.

We will give some familiar examples to show how the nervous condition is developed as assimilation is weakened: first, by sudden abstraction *en masse*; second, by slow and gradual abstraction.

*Anæmia*.—Observe a woman surprised by an abundant and fatal hæmorrhage. In a few moments the heart will beat more quickly; soon irregularly. This is a commencement of spasm. Anxiety at the epigastrium, nausea, fainting, soon appear. The stomach throws off all its contents. A gaseous secretion distends the intestines, their vermicular movement is exaggerated, they move in various directions. The least emotion agitates, produces unbounded effects. The slightest impression produces lively emotion. Tears flow without motive. Respiration is thoracic and frequent, or slow and sighing, often interrupted by deep yawns. The eyes soon roll up, a sensation of strangulation is felt, the neck and arms are twisted, the trunk stretches itself convulsively, the legs are flexed, and an hysterical or epileptiform attack occurs. If the bleeding keeps on, the above symptoms increase in intensity, the convulsive attacks become more frequent, and often at a moment when the loss of a few drops more will produce certain death, the convulsions are at their height; their energy is frightful; then comes a general and sudden check, the icy calm of which is interrupted only by a few twitchings. The jaws set, the face grimaces; then, after one last deep breath, the woman expires.

To the observer, this picture affords a profound lesson in therapeutics.

But the warm and palpitating corpse contains other lessons.—If you cut an animal's throat, and remove the heart and entrails suddenly, the heart beats outside of the chest, the entrails contract—beat both in vacuo and without reason, if we may so say. These phenomena constitute spasm, taken in the act, unveiled in all its truth; for we cannot better describe and define spasms and neuroses than by saying that they are useless sensations and movements, without aim or destination.

It is evident from these first examples that the rapid removal of blood causes in the nervous system of organic life an unusual, irregular action,



illegitimate and aimless movements, and thus becomes the most efficient cause of maladies of the nerves, neuroses.

If the relation of cause and effect were always as plain and striking as in the case just delineated, every one would be convinced. But when the cause is not before our eyes, in material and irrefutable form, when the only effects appear under forms more or less insidious and simulating diseases of another sort, then it is harder to assign them to a common and genuine cause; then occur the worst therapeutic blunders, especially since the reign of physiological medicine and of the school of anatomical pathology.

But, though less evident, the physiological cause is not essentially different, and the therapeutic indications also remain the same, in the absence of specific agents able to destroy the morbid principle directly.

To prove this, let us now take cases of less marked features; let us observe these features in still more obscure cases, where induction and analogy must be invoked; and lastly, in cases where the only touchstone is found in the effects of tentative treatment, as if to give a striking application of the Hippocratic axiom: "*Morborum naturam curationes ostendunt.*" By thus passing from simple to complex, from the incontestable to the less apparent, and observing the impossibility of drawing a line of separation, we shall succeed in throwing light and bringing persuasion.

Nothing is more common than for women whose menses are excessive in quantity, or return several times a month, to be tormented with vapors and nervous troubles. The digestion is soon affected; the nutritive functions disturbed; the crasis of the blood is weakened, and menorrhagia increased; and from this indefinite aggravation of cause by effect results a dilapidation and a disorder, a functional perversion and a radical debility, from which it is hard to disentangle the true indications for treatment. What adds to the doubt and confusion is that some secondary symptoms are almost always so prominent as to attract the chief part of the attention, and form the basis of diagnosis. The stomach and its functions very often furnish such. The gastralgia and constipation are here only symptomatic of anæmia.

The nervous condition of women, due to habitual hæmorrhages, is no more to our present purpose than that due to other similar causes. We give it, however, the first place, both for its importance and for the influence its solution ought to have upon practice.

When the system is suddenly deprived of a large quantity of blood, the animal functions are the first to suffer. The brain, the senses, the locomotor system, are the first to announce the insurrection of the nervous system. Then, if the subject survives, and blood is not soon restored in quantity and quality, various functional lesions of the abdominal and thoracic viscera soon appear. But if the assimilative faculty has been slowly despoiled of its material, as in the case of menorrhagia, and particularly if the despoiling has been a slow process, by untimely and



prolonged dieting, chlorosis, cachexia from intermittent fevers, or other conditions of which we will speak below, the first functional troubles are in the stomach and heart.

If in this case the latter organs give the first sign of the spasmodic condition, need we be surprised? Have we not pointed out, as a characteristic of trisplanchnic innervation, the necessity of continual action; and in that state of perfect equilibrium which constitutes health, have we not noted the silence, the obscurity, the latent action of these forces, and the absolute ignorance in which the brain ought to rest in respect to these vital operations? The nervous action which regulates these operations cannot cease without putting an end to life; hence it goes on, in spite of the insufficiency of the reparatory material which it has to work upon. But as soon as it ceases to be absorbed and regulated by the operations preparatory to nutrition, it gives rise to all sorts of pathological phenomena, which, perceived by the sensory centre, constitute those abnormal (that is, useless and objectless) sensations and motions which are called spasms and neuroses.

The stomach, or rather the solar plexus—the sensorium commune of the vital sense, as Grimaud elegantly conceives—is the focus whence the greatest number of spasms, pains, functional troubles arise. This centre is to the vital and natural functions that which the brain is to those of relation. Its office, so to speak, is to sum up and express the discomfort and suffering of the other viscera. Thus, it gives rise to the normal sensation of hunger, and transmits to the brain the sense of this essential need—a need not confined to one organ, but which only one has the privilege of stating. This viscus, then, whose acts ought always to be unknown to the ego, is the first to experience erethism when the system is suffering a famine of reparative material. The word erethism needs a definition; it is employed by most people to express irritation, orgasm, excitement, excess of action, force, etc.

Erethism is the morbid susceptibility of an organ due to privation or insufficiency of these physiological or natural stimuli. It is the most certain sign of weakness. The physiological stimulus of the stomach is food; that of the whole system, and the circulation of the heart in particular, is the blood.

An unsuitable diet puts the stomach in a condition of erethism. If you add anæmia, the whole economy shares in the erethism. The epigastric centre also, as the sensorium commune of the vital sense, will feel and reflect the general suffering, and there is no sort of abnormal and painful sensation of which it may not be the seat. If, as is usual, the chief symptoms are pain in the epigastrium increased by pressure, weight, cramps, and discomfort of the stomach after eating; still more if there are also palpitations, headache, oppression; still more, if heat, burning irritation, is felt, with eructations of gas and food, etc., you may be sure that the word gastritis will be uttered; the words leeches, diet, mucilage, milk diet, chicken broth, etc., will follow, as the shadow follows the body.



And what then? The unhappy woman (it is almost always a woman), relieved for a moment, is soon plagued with general troubles and local irritation worse than the former; even milk begins to disagree, because it is a law of erethism that the greater is the loss of normal stimulus, the more does the weakness and the susceptibility increase; the slightest pressure on the epigastrium may produce convulsions, tears, or loss of consciousness. All this will confirm the diagnosis; the gastritis is thought to be making progress in spite of the antiphlogistic treatment; a new indication is thought to be found in this circumstance for renewed activity of treatment—and so on for years, as we, unhappily, have too often seen.

A gastritis, sufficiently intense to produce the pain and other symptoms of the erethism or the neurosis we are describing, would not last many days without disorganizing the mucous coat of the stomach, producing peritonitis, etc.; but the state we are describing has no influence of itself upon nutrition, and is never dangerous to life of itself.

On the other hand, we have for a very long time been seeking in the hospitals and elsewhere for spontaneous, acute, frank gastritis; but up to this time we have reached no other result but this, that the disease is, for us, a chimera, a creature of fancy. We have observed acute gastritis produced by the contact or ingestion of poisonous substances, acids, concentrated alkalies, alcohol, etc., and that which follows indigestion or a too stimulant meal, and is cured by two or three days of abstinence; but we repeat it, never, except under the preceding conditions of causation, have we recognized a disease consisting solely and primitively in acute inflammation of the gastric mucous membrane. The only acute gastritis observed, except in poisoning by irritating substances, is that which might be called gastritis crapulosa (gastritis a crapula of some nosologists), to which scarcely any but men are subject; while we have observed that women are more specially liable to gastric neuroses, which are so commonly taken for phlegmasiæ.

We need not pursue the differential diagnosis.—But we will add that it is well to distrust excessive sensibility under pressure in the epigastrium. This exquisite sensibility is scarcely a property of pure gastritis. When closely questioned, women will admit that it has no analogy to the pain produced by pressing an inflamed part. It is rather a painful anxiety, a spasm, an indefinable malaise, than an organic pain properly so called. The pressure causes a sense of oppression, of cardialgia, of collapse, quite like that which attacks the same region under the sudden influence of a painful emotion, a surprise, a severe fright, etc.; and furthermore, there is another affection of the stomach which is observed independently of this state of erethism, and which causes horrible epigastric pains, namely, gastralgia—which, also, is not a gastritis. Many persons in perfect health of stomach cannot stand the lightest pressure on the epigastrium without severe pain.

The state of which we speak very rarely causes vomiting, while acute



gastritis is always accompanied by it.—It has been repeatedly stated of late by sceptical and minute observers, on the faith of necropsies and facts which seem most exact, that the state of the tongue has no connection with that of the stomach; inflammation of this organ is no more indicated than that of any other, by redness and dryness of the tongue. This notable error has been one of the chief causes that have prevented physicians from giving up their blindness. In the cases we speak of the tongue is moist, red, large; it has all the signs of health, except that, in many cases, its papillæ are excessively developed. Or they may be only salient, and grouped towards the tip of the tongue, bright red, and deprived of skin as it were, in which case they show, if not a proper gastritis, at least a shade of vascular irritation of the mucous membrane of the stomach added to its nervous irritation, and the physician should always keep this complication in mind. Or the tongue is red, not lanceolate, the papillæ not inflamed, but erected and pressed together like the pile of woollen velvet, occupying the whole surface of the organ; then the affection of the stomach is purely nervous—gastralgia, or dyspepsia with erethism of the organ.

The sensation of heat, burning, irritation, in the absence of other signs, has no value as a characteristic of gastritis. When the innervation of an organ is deranged, it may produce, as if by hallucination, sensations which in health result only from fixed causes; and this, in the absence of any material cause, any added stimulus, any organic lesion. The skin itches and burns without any visible cause; the stomach gives the sense of hunger and satiety, independently of want of food or repletion, etc.

Difficulty of digestion, oppression, eructation, etc., are of no significance in respect to gastritis. They are the effect of any condition of the stomach which interferes with its functions. Nobody supposes that gastritis is the only thing which can interfere with digestion. We will say the same of the palpitations and cephalalgia which accompany the act of digestion, and do not belong exclusively to gastritis.

Our diagnosis must be based chiefly on etiological circumstances, the general condition, the effects of various treatment, etc.

An important distinction between the neuroses, debilities, erethism—of the stomach or any other organ, or the whole system—and inflammatory diseases, is the fact that in the latter, function and act are blocked, the vital manifestations abolished, stupefied, impotent; while in the former, all these are exalted, exaggerated, mobile, aroused on the slightest occasion; in a word, have sensations and movements of which a merely inflamed part is incapable.

Thus the stomach, in the state of erethism, often gives a sensation of unappeasable hunger. A like sensation is never felt in gastritis, which is, on the contrary, accompanied by absolute disgust and anorexia. The latter is a distinctive sign of the highest importance.

When the circulatory organs, and the heart in particular, are in relation with blood which fails to excite them sufficiently to regulate and re-



strain their movements, the erethism of the system is straightway announced by palpitations, suffocation, thoracic spasms, frequency and false energy of the heart's beat, irregularities of temperature, and often a real erratic, slow, nervous fever.

The reproductive system soon gets the upper hand, and the most incredibly varied hysterical symptoms torture the life of the woman. The nervous system of animal life soon shares in the erethism, which then becomes general; and the most simple, the least fatiguing intellectual impressions, sensations and occupations overtask and worry the brain and the senses.

If, after showing the effects of slow and rapid loss of blood upon the nervous system, we should examine the effects of withholding the aliment from which blood is formed, or inanition, we should have to write the entire nosology of nervous affections, for this condition allows or excites all of them.

But let us turn to chlorosis, which presents the pathological type of the cause and the effects which we are studying.

*Chlorosis.*—In this disease, usually at the period of puberty, without any loss of blood, any insufficiency of food in quantity or quality, or any hygienic circumstances likely to injure assimilation, the forces which govern this process languish, the principal viscera become inert, the blood grows poor, loses its plasticity and redness through a considerable diminution of the globules. Then the most alarming debility and erethism occupy all the organs, and the patient often presents a table of contents of all the nervous affections.

What alterant force has been able to reduce the blood to this state, in which it is only an abundant serum bearing a few flaccid, pale globules, without vital affinity? What cause, what reversal, have thus stopped the movement of vital composition and decomposition? for in chlorosis these are suspended. Abundance of blood circulates in vain; it fertilizes nothing, gives nothing, removes nothing. The vegetative acts are blocked. Vital chemistry is stricken with inertia. There remain in the system none but nervous phenomena, and those of a perverted sort.

The question is not one of pure curiosity. Its solution ought to have a great influence on the prophylaxis of chlorosis, and especially on the treatment of the first symptoms.

An apparatus which for fifteen years has given no sign of life, because up to that time it had been of no use to the existence and the physiological rôle of woman, suddenly awakens, and becomes the centre of new functions which claim an amount of vitality so great and so special in its nature, that it seems as if a new creature had been added to the former (“uterus animal in animali”), and were governing it so as to characterize the woman, “making her” (to use Van Helmont’s energetic expression) “what she is.” Van Helmont also spoke of the uterus as a stranger in the economy, dependent on the latter only for nutrition, “pere-



grini hospitis instar, a corpore non nisi animaliter dependens;" while the woman obeyed its rule, "mero regiminis imperio, totam regit mulierem;" and it led the woman as the moon raises the water of the sea, "perinde atque luna solo adspectu aquis præsidet, eo quod uteri vita atque potestas toti imperet mulieri."

In some women this empire over the organs is established easily, without resistance, strife, or trouble. In such, the period has been long and gradually prepared for; puberty, menstruation, fecundity, the new being, develop unknown to them, and continue to bear a mild sway. Such are seldom chlorotic or hysterical unless subsequently causes arise which determine these conditions. In others, however, the period of puberty is the signal for the most violent disturbances. The establishment of the uterine functions meets with the greatest obstacles. It is chiefly then that this system rules the whole organism; for vitality deserts the other apparatus. The digestive, respiratory, circulatory, secretory systems lose a great part of their nervous influence, to the advantage of the organs of generation; and while in non-chlorotic young girls this first momentary concentration of the whole system of forces upon the uterus is soon followed by a radiant superabundance and expansion of general life, in those affected with chlorosis the compensation is not made, and the womb, the centre of so many efforts, languishes, and fails to enter upon its important attributes; it does not give back the influence of which it deprives the other organs. The relation between the acts of assimilation and innervation is almost destroyed, and these two orders of functions exhibit only disturbance, imperfection, and impotence.

Thus, there are two facts to consider in the study of chlorosis and in the interest of its treatment, although in general, and at present in the school of Paris, only one of them is thought of importance. It is taught that chlorosis consists essentially in a considerable diminution of the globules of the blood, and the disproportionate increase of the serum; and that correct treatment ought to aim at restoring the physiological composition. Here is but half of the truth; for it is said that chlorosis exists only when hydræmia is well marked: it seems that the disease only begins at this moment, though it is really only an effect which might have been anticipated at any rate.

Here it is important to enter into the refutation of the errors of the disciples of chemical therapeutics, in respect to the use of iron.

Chlorosis is defined by one of its effects, the diminution of blood-globules, and of the iron which is one of their normal ingredients. Not inquiring how the iron diminishes, and taking this fact for the disease, they do not ask how it is restored, and take restoration for cure. This is the more prized, as iron seems to contribute to the coloring matter of the blood; and, pallor being one of the most striking symptoms of the disease, the improved complexion is regarded as complete evidence of cure, and as cure itself. But where are the life and the organs meanwhile?



The specific in chlorosis is then of a different sort from mercury and cinchona. The latter are destructive specifics, alterants; iron is a more generous specific, for it directly reconstructs, by itself, like a food. It is to the chlorotic not a morbidicide specific, but a hygienic specific. However this may be, it has the distinctive mark of specifics—that of acting by itself and without the intervention of the organism; and it must be acknowledged that the existence of the normal iron of the blood, its diminution in chlorosis, its reappearance under chalybeates, gives an air of probability to the theory.

The iron, then, allies itself with the pre-existing molecules of iron, and this alliance (“soldering”) is all the process?

It is forgotten how, in many cases, a chlorosis which has resisted enormous doses of iron well absorbed, suddenly yields as by enchantment to a journey or an agreeable feeling, which has not introduced one atom of pharmaceutic iron into the system. Chlorosis gets well without iron just as it does with it; and there are several tonics which give the same result.

Nevertheless, if iron excites regeneration of iron in the blood more than any other medicine, the amount existing in the coloring matter of the globules is so small that the enormous size of the doses and the excessive prolongation of the treatment are evidently mere accessories, and may cause several inconveniences unless restricted within scientific limits. If, in order to cure chlorosis, we require only to replace iron by iron physically, why is it that other cachexiæ, equally marked by diminution of blood-globules, are not in the least benefited, but rather made worse by iron? The fact has been neglected, that chlorosis is almost the only kind of morbid anæmia of which iron is the special remedy. The chemists say that the vitellus of a hen’s egg contains all that is needed to form the chicken. They say that traces of iron are discovered. But they do not say that after incubation, at the moment when the chicken is about to break the shell, before it can have borrowed iron from the outer world, its blood contains iron in much larger quantity than the vitellus could have furnished. We prefer to think that the analyses have been poorly made; otherwise, rejecting the idea of spontaneous formation of a simple body, we should have to conclude that the egg absorbs iron through the shell along with the respiratory elements of the atmosphere, or else that iron is not a simple body.

However this may be, iron cannot be longer regarded as a specific. Chlorosis is developed without direct removal of iron; without hæmorrhage; it recovers spontaneously, without the administration of iron; and when it recovers during its use, it does so because the hæmatomic powers of the vessels have been stimulated by it to the formation of blood-corpuscles, as the stomach and the lacteals may be to the formation of a richer chyle. Iron does not act by increasing immediately the quantity of pre-existing molecules of iron, but by stimulating the formation of new iron-bearing globules.



The power which forms blood exists previous to the iron, and without it iron would have no more effect than in a glass. We do not deny that there is a special connection between the properties of iron and the hæmotosic properties of the circulatory apparatus; but the connection is a physiological one. Iron certainly excites the formation of the red globules more specially than that of the lymph or bile, as aloes has a special power over the secretion of the intestines rather than that of the kidneys; and digitalis acts on the heart. But in this I do not see anything specific as regards the disease,—which is what a specific claims.

Iron plays one part in hæmatosis, and oxygen another. Its normal and constant presence in the globules is a token of this function. It supposes in these living bodies, and in the vessels where they are formed, certain hæmotosic energies, of the existence of which this metal is one condition.

We will say as much from another point of view concerning the compounds of soda which are so common in the blood, where they correspond as special chemical stimulants to other homologous properties of a superior order. They are not the efficient cause of the latter, but their co-ordinate excitant cause. They may be regarded as a sort of condiment, always present, always necessary for the regular fulfilment of the incessant combinations between the elements of the blood, or between it and the different organic tissues.

The sanguifacient properties of iron have some analogy with these.

Iron restores the blood by intussusception or generation, not by mixture or juxtaposition. The clinic shows daily that its diminution is an effect, not a cause of chlorosis, and that its reappearance is an effect and a sign of cure, not a cause. If one fairly grasps this fact, the question is decided. Yet there are those who admit it, and yet persist in calling iron a specific in chlorosis; which gives at once an idea of the strength of the specific and of its defenders. If the diminution of iron is only an effect and sign of chlorosis, how can its increase be a cause of non-chlorosis?

It is true that the effect increases its own cause. It follows that everything which can act against this effect has an action against the cause itself, however indirect. We maintain that if iron were the specific for chlorosis, chlorosis could not get well without iron. Therefore, when chlorosis recovers—not spontaneously, but during the use of iron, and the globules and their contained iron are regenerated in proportion to the amount used, the mechanism is the same as when they are regenerated spontaneously and without the aid of iron. Why does not the iron of the food suffice? Does the food nourish by juxtaposition? Must it not be assimilated, transformed, impregnated with the life of the organism and made akin to it? Could it produce this effect of itself, although, to use Borden's expression, it has experience of life in general? Is it, then, iron that by itself gives to the young girl this warmth, this fruitful vascular organism, this circulation of life, of sensation and movement, which seem to raise her in a few days from the reptilian to the mammal state, and revivify all the appa-



tus, in the order in which the organs are developed in the embryo and their functions in the animal after birth?

What have we been explaining—the properties of iron or those of the chlorotic organism? Neither of these; but a true generation, occurring in the midst of a perpetual movement of blood at all points of an immense network, everywhere present, as the matrix of hæmatosis ought to be; for the function is universal in the circulatory apparatus, and in every vessel, and at all points of every vessel, blood is forming, or one act of its formation is occurring. Who that has ever watched, as a physiologist, this spectacle of chlorosis in process of cure, can deny that the process is a true organic evolution?

This generation is what we have described in the cure of chlorosis. But, though as general and as manifold as hæmatosis, it still differs from that which is constantly going on under the influence of reparative nutrition (so happily named by Bacon elementary generation, “*motus generationis simplex*”) in these points: the elementary act, when performed by nutrition (of which organic substances are the seed), fully transforms the substance of the body and is one with the vegetative life; while, when performed by chalybeate medication (presenting only an inorganic stimulus to the blood), it has no effect save to arouse excitability in the blood and certain forces which are to this liquid what the nervous substance is to the entire system. What the chlorotic patient’s blood wants is life much more than quantity. This is not so in phthisis and the cachexiæ of organic maladies. Anæmia acts primarily on the vegetative life of the blood. Thus, iron, when not injurious, fulfils in it only secondary indications.

The pretended specific action of iron in chlorosis, then, unfolds to us the spirit of the doctrine we are stating. Iron, like all medicines, acts only indirectly. The immediate and real action, the efficient action, is performed by the vivified remedy; it is the treatment, or (what is the same thing) the organism physiologically impregnated with the drug. This is what should be aimed at, and what makes a cure, provided that the system consents twice—once as in health, to the physiological action, and once as in disease, to the therapeutic action. Now, that which deprives iron of all title as a specific in chlorosis is, that as soon as the system feels the physiological action of iron, all is over; the curative effect is obtained, and the system does not assent, as in a state of sickness. Why this exception? Because frank chlorosis, exempt from all pathological association, is less a real disease than an organic imperfection in evolution. The older nosologists included it among debilities.

The genital apparatus has a powerful and quite special influence upon the digestion and hæmatosis of woman. At the epoch of puberty, if the life of this apparatus remains concentrated in itself, and does not extend its influence over the functions of individual preservation, the latter fall into a state of peculiar languor and inertia, which is one of the thousand aspects of hystericism. The digestion is impaired, hæmatosis lessened, the heart and vessels are attacked by a violent erethism and are



agitated spasmodically, like all starved organs; the functions most closely related to intelligence and will are a bizarre mixture of torpor and irritability, etc., etc.; chlorosis is present. Here is not a disease in the sense usually attached by nosologists to the word; no decided morbid vice, parasitic in the economy, the proof of which is that the healthiest woman may fall into such a state after a hæmorrhage or a simple weakness of the uterine system or accidental disturbance of menstruation. It is a want of equilibrium between the two systems, in the perfect harmony between which consists the strength and the health of woman.

We here speak of free chlorosis in those girls, generally dark-complexioned ("chlorosis fortium"), who do not suffer a loss of richness of outline, nor of elasticity of tissue. These cases form the triumph of iron, the chlorosis being pure and free from all association with a diathesis such as the tuberculous, and from all the forms of combination with other morbid elements. In these cases of free chlorosis, as soon as the system is medicated with iron, the cure is as complete as it can be—for the two are one. The harmony between the two lives may again be disturbed, and chlorosis relapse; but the cure may also persist, and not very rarely. The condition on which iron acts as a specific in chlorosis is, that the latter shall be pure, frank—that is, as unlike as possible to diseases which have specifics. Unless the iron finds these fine types, its action is uncertain, imperfect, soon exhausted, causes accidents and intolerance, acts as an inert body, or as a very irritant substance. False or symptomatic chlorosis is then a real disease, or is associated with a real disease, and at once ceases to possess a specific; an excellent proof that it never possessed one, and that in the most brilliant cases iron acts only the part of a hygienic condition. It is a kind of physiological condiment which we may suitably offer to the system when unable to assimilate food, or to feel the stimulus of the non-nutritive elements which form a natural seasoning to the food. But though the condiment acts differently from food, it does not escape the general laws of life.

Just as the food which is not assimilated is a foreign body in the system, and as this assimilation is nutrition itself, so iron (I might add soda, sulphur, phosphorus, relatively to other functions), a non-alimentary substance, but an exciting cause of sanguification, is an injurious substance in the body, as such is eliminated, and determines in it a factitious disease unless the system possesses certain properties which, revived by iron, constitute medication by iron.

This distinction is of the highest importance, and we prove it by the difference between the cure of chlorosis and that of a simple or physiological anæmia following hæmorrhage. In curing the latter, reparatory food, meat (containing iron, no doubt) suffice. The therapeutic action is mingled with the physiological, and pharmaceutical preparations of iron are rarely needed. In chlorosis it is not so; the preparations are often indispensable. What could we say more directly against its specific nature?



We have shown that humoralism and chiniatria always take effects for causes. Does the name chlorosis (*χλωρός*, greenish yellow) restrict the vision of observers, preventing them from recognizing the disease before it has reduced the blood of girls to the condition of that of cold-blooded animals? It would be much better to call it, as Morton did, nervous phthisis, a term full of pathological meaning and therapeutic indications. Chlorosis is at its height when it is visible in the greenish pallor of the skin and the colorless mucous membrane. This external condition takes away the merit of diagnosis, and announces that the physician has already lost much time.

Chlorosis, before reaching this point, is long preceded by suspension of the action of the principal viscera and the alterant forces; they are as it were paralyzed, plunged in a torpor like that of hibernation, but with the difference that an infinity of nervous disorder appears in proportion as the phenomena of nutrition lose their activity, and the blood its organizable elements. Further, these nervous disorders in this case are influenced by the developing condition of the genital organs—an influence so mighty that it causes and characterizes, by itself, the chief neuroses of woman.

We may divide this malady into three epochs, which follow one another in a necessary relation of cause and effect.

*First epoch.*—The action of the visceral apparatus becomes slow, almost null. Assimilation is as if suspended. The heart and stomach shows their erethism and weakness by their abnormal sensations and movements. The poverty and liquidity of the blood cannot yet be accused of producing this state of languor and of nervous accidents, for they precede anæmia and produce it. This first period, during which the blood changes—or rather becomes impoverished—may last very long before the chlorosis is revealed to everybody by the complexion.

But the inertia of the assimilative forces, the erethism and the perversion of visceral innervation which are its necessary consequence, are not without influence on the composition of the blood; it loses its vitality at last, is insensibly despoiled of its organic elements, and the young girl falls into the “green sickness.”

*Second epoch, or confirmed chlorosis.*—In general the disease is not recognized previously. The hydræmia which results from the preceding period becomes in turn a cause, and produces upon the entire system the effects of slow loss or impoverishment of blood. This indefinite aggravation of cause by effect sooner or later brings on the third period, unless the uterine functions are perfectly re-established and give to the vital faculties their normal equilibrium and power.

*Third epoch, or chlorotic cachexia.*—Excessive erethism of the circulatory system produces a remittent or continued nervous fever which consumes the system, and then we may say that the organism consists solely of a horribly exasperated nervous system. Life is maintained by a series of impressions, all of which are spasms or pains. The natural

hygienic agents, when exercising their gentlest effects, provoke incessant disorders of contractility or sensibility. The entire existence is but a sensation of suffering, anxiety, and general distress. The person, or its survivor, a useless nervous system, may be extinguished by exhaustion or by colliquative discharges and phlegmasias of the principal organs, such as those seen in persons who starve to death or succumb to various kinds of nervous hectic fevers.

We have now a remark of the highest importance to make.

In many cases, the external signs of the second stage are entirely wanting. In some young persons pallor never exists; chlorosis exists only to the eye of the mind, but exists nevertheless. By saying that in these cases chlorosis is seen only by induction, we mean only that the complexion is good, and may lead to errors; for the blood of the menstrual discharge (very many chlorotics have their menses), or that from leech-bites or venesection, has all the marks of chlorotic blood.

The illusions, the deplorable mistakes, the false treatment which spring from ignorance of this fact, are truly incalculable.

The fact of an undecided or retarded puberty, the resemblance of the symptoms to those of confirmed chlorosis, the patient's melancholy, depraved tastes, eccentricity of character, especially the appearance of the menstrual blood or that obtained by a slight prick, the cardiac bruit de souffle, the dilatation of the cardiac cavities, the various rhonchi, bruits de diable, whistling of the arteries, etc., etc., may furnish material for a diagnosis independently of the chlorotic tint.

But if this circumstance can give rise to so many errors, how will it be with women whom their age, the regularity of their uterine functions, the appearance of good health, seem to exclude from chlorosis, and who have suffered no loss of blood sufficient to weaken the organism and disturb the nervous system?

It is, however, very certain that most of the nervous ills of adult women—the form of hysteric which (under Anti-spasmodic Treatment) we call hysterical vapors, undecided, non-convulsive hysteria, and most of the spasms whose aura begins at the epigastric and cardiac region—are very often due to inactivity of assimilation, to poverty of the blood, which in turn are due to interruption of the normal physiological relations between the functions of reproduction and of individual preservation.

Certain developments and distinctions are here indispensable.

Sydenham, with admirable reason and medical sense, says that chlorosis is, without doubt, a kind of hysterical affection. "*Chlorosin sive febrim albam quam quidem speciem esse affectionis hystericæ nullius dubito.*"

It would be neither less just nor less practical to state that hysteria is a species of chlorosis.

Under Antispasmodic Treatment we have admitted two principal forms of hysteria, or of nervous malady with the uterus as its focus. One is characterized by convulsive attacks. In modern works, in exam-



inations, and all the public acts preliminary to the degree of doctor, in the clinics, etc., this is almost the only one named. The chief point attended to in treating of it is to make the differential diagnosis from epilepsy.

We have said, following Sydenham and our own observation, that convulsive hysteria affects principally strong, vigorous women, those least subject to nervous evils, "*temperamento ut plurimum plus quam solet sanguineo;*" those of a virile habit, "*habitu corporis ad viragines accedente.*" This form is the least interesting to study from the therapeutical point of view. It is little modified by the most potent palliatives of spasmodic disorder. Those which we are now studying under the name of radical remedies have much less influence in these cases; they may even do harm, or at any rate, no good. The true treatment for this convulsive hysteria lies in active and continual use of the muscular forces, bodily toil, and varied gymnastics, in the fatigue of exercises which women in society in general shun; for we hardly observe it in country women, in those whose position forces them to do men's work, and who, as Sydenham says, lead a hard and toilsome life: "*quæ laboribus assuetæ, dure vitam tolerant.*"

Women of this class are mostly protected from convulsive hysteria and vaporous hysteria: the former, because the spinal innervation is incessantly flowing out for physiological acts, and the resulting fatigue prevents convulsions and produces sleep, which is their most potent solvent; the latter, because the bodily exercise produces an activity and fulness in the vegetative life, in digestion, circulation, hæmatosis and assimilation, which guarantee stability and calm of the nervous system.

This leads us to our question, and to the development of Sydenham's proposition, the terms of which we reversed, thus: the nervous ills of women, vaporous hysteria, are a species of chlorosis, or, to speak more exactly, a special erethism of the nervous system, produced by debility and insufficiency of the nutritive operations, which have become impotent to impart tone and restraint to the system.

This state, produced by the alterative or the weakness of the influence of the reproductives on the digestive, hæmatogenic and circulatory functions, develops and exists in two ways, which nevertheless do not give rise to different pathological results, and make no change in the nature of the therapeutic indications.

In consequence of natural weakness of temperament, constitutional or accidental poorness of blood, atony and imperfection of nutrition, the uterine nervous system acquires a state of erethism and predominance soon shared by the general nervous system; or else this predominance is primitive, begotten by direct causes, such as the passions and that which acts directly on innervation. In the latter case that follows, which we noted in the first period of chlorosis, namely: that the other organs are deprived of their vitality in various degrees, nervous disorders commence, assimilation languishes, and, hæmatosis and assimilation becoming imper-



fect, the woman falls into a state of doubtful, imperfect chlorosis, sufficient to prevent the nervous system from recovering its stability and the strong calm of its movements.

Hence appears the reason why women subject to the convulsive and intermittent form of hysteria are generally robust, often of vigorous constitution, while those with hysterical spasms and nervous troubles have generally a weak and languishing constitution and health. In the former, the nutrition cannot be injured by a few attacks at long intervals, affecting only the cerebro-spinal axis and its dependencies; while in the others the nervous state is almost continuous, affects chiefly the trisplanchnic system, which it distracts from its natural and regular action by a thousand tricks, and thus brings on hysterical cachexia, as we shall state hereafter, and as Sydenham formally enounced in a long passage to be seen in a subsequent volume.

If asked why hysteria takes the convulsive and epileptiform shape in muscular women of strong constitutions, while in feeble, slender women with weak locomotor powers it takes the spasmodic, vaporous form, with those infinite aberrations of sensibility and of the reaction of the lower apparatus which constitute the nervous state,—we might answer that the vigor and activity of the muscles of relation in the one call out the convulsion, so to say; that the exuberance of innervation, during an attack, is naturally exhausted by the excess of action in the most powerful apparatus; that the pathological movements follow the lead of physiological habit, while in the other the hysterical phenomena, finding an organism too delicate and feeble, do not go to the extent (if we may so speak) of reacting on the nervous centres of animal life; and instead of being distinctly affected and betraying themselves, as in all stronger organizations, by an impetuous development of external movements, they affect the whole nervous system indefinitely and without exhausting their forces, exciting disturbance which, while less violent and rapid, is still more injurious, more indefinite in extent, and more desperate. No one has better expressed than Broussais this invariable habit of nervous affections to last indefinitely, or else to show themselves by violent crises of movement—that is, convulsions.

But, besides anæmia, there is another pathological cause for these generalized diseases of the nerves, irregular hysterical neuropathies without convulsive attacks, affecting under a thousand forms the apparatus both of organic and vegetable life. We think this cause is a general affection, or diathesis, which rules and produces at once the anæmia and the nervous symptoms. Neuroses, like phlegmasiæ, are very often only the symptomatic expression of one of those general morbid dispositions called diatheses, which display themselves under all sorts of borrowed forms. When hysteria appears under these anomalous forms, its elements isolated, and in irregular combinations, rather than grouped in the order observed in the free attacks, the existence of some deeper and more general morbid disposition must be suspected. If, in addition to hysteric



symptoms, we observe pseudo-inflammatory congestions, rheumatoid affections, fever without type, a little redness of the tongue, pains in the limbs, neuralgias, anorexia, some more or less superficial catarrhal symptoms, emaciation, and finally anæmia, we have to believe that these symptoms do not form the entire disease; and we find that the anæmia often does not yield to analeptic tonics, which sometimes even increase the nervous symptoms. In this case the nervous complications are not to be attacked through the anæmia, for they are not a consequence of it. A more general cause governs both. But yet, if the digestive tract is in good order, and the lungs free from tuberculous tendencies, iron, though not victorious as in the neurosis of pure chlorosis, fills useful indications.

Hysterical spasms are not always produced by the organic affections which impair nutrition and weaken the blood, as they are by those which are destitute of this causal element. It seems as if the organic lesion then played the part of a powerful derivant or exutory, which, like all the operations of the alterant force, checks the free development of nervous symptoms. This remark is a confirmation of our general principles.

What happens, for instance, during and after acute diseases treated by repeated evacuations, and a long absolute diet? While the influence of grave inflammations (as an acute fever) exists, the nervous condition holds its peace; it is not suspected. But let the inflammatory lesions depart, the fever burn out, convalescence become established, and if proper food is too long withheld we shall see spasms appear; hysteria, perhaps for the first time in the woman's life, may display its whole budget of symptoms, until an actual alimentary fever, of a physiological nature, replaces the erethism by force and puts a check on the exasperated nervous system.

### HYPOCHONDRIA.

Man is subject neither to hysteria nor chlorosis, though not exempt from diseases of the nerves and anæmia. But while analeptic tonics may be required in his anæmia, it does not follow that his nervous diseases present identical indications, as may be the case in the chlorosis and the hysterical nervous ailments of women.

This difference is due to the fact that, during the whole period of uterine life, woman's neuroses have a more or less hysterical character, and that hysteria has quite close relations with chlorosis.

Man has no nervous affection or cachexia which may not exist in woman. But there are certain varieties of anæmia of which we will speak as belonging more especially to man. First, there is the anæmia of hypochondriacs, often determined by neuroses of the stomach, gastro-enteralgia, dyspepsia. Paludal anæmia holds an important place in the cachexies of man. The unwholesome professions, the excesses to which man is more exposed than woman, have their species of anæmia: such are the



saturnine and mercurial cachexiæ—those of zinc-workers, miners, forgers, glass-blowers, bakers, etc. There are diseases of the spinal cord often associated with anæmia. It exists in certain very grave general paralysees, called progressive, which seem to attack the whole locomotor system at once, and to originate at once in the sensitive and motor terminations of the nervous system and in its centres. The latter affection is often caused primarily by a rheumatic or gouty diathesis, in debilitated persons, or those enervated by physical fatigue, grief, or excesses. It appears that the system is unable in these cases to individualize the disease, and to localize it frankly for the general benefit.

It is surprising that, since the recent exact and minute investigations into rheumatism, we still neglect the dangerous power possessed by that disease, of producing a spasmodic and secretory irritation in the apparatus of circulation and hæmatisis, indicated by morbid movements of the heart and the blood-vessels, progressive diminution of the blood-globules, and increase of serum. This produces a serous plethora and a sort of cachexia, which deserves the name of rheumatismal. This morbid state is quite common after acute inflammatory or articular rheumatism. It begins, we believe, with that disease, and forms thenceforward one of its special marks; but its character appears most clearly towards the close, when the masking inflammation becomes less intense. It is often seen persisting indefinitely after the cessation of articular inflammations, and forming a cachexia sui generis. A chronic endocarditis, an organic lesion of the orifices and valves of the heart with consecutive hypertrophy, in certain cases accompanies this condition, soon rules the symptoms, and impresses on them a character of extreme gravity. But it is certain that rheumatismal cachexia is also seen alone without any visible relation to a proper organic lesion of the heart.

Of the great number of sorts of anæmia without organic lesion, there is none in which iron succeeds so well as in chlorosis. But it must never be neglected, except perhaps in dyspepsia and gastro-enteralgia, in which, with few exceptions, it is more harmful than useful. In paludal anæmia it is useful, but secondarily. We will say as much of its accessory uses in the saturnine and mercurial cachexias. An animal regimen, wine, cinchona, insolation, stimulant baths, and frictions—these do as much as, and more than, the martial preparations.

In a word, iron finds much wider application in the diseases of women than of men; probably because chlorosis, the chief triumph of iron, is usually an element, if not the sole constituent, in woman's anæmia.

The nervous system of the digestive apparatus in man is to hypochondria properly so called that which the nervous system of the generative apparatus in woman is to hysteria.

The visceral focus of hypochondria is the apparatus of individual preservation; that of hysteria, the organs of reproduction of the species; as to symptoms, those of hysteria are all kinds of spasms or convulsive attacks. The former seem to us produced by a diffusion of the uterine



aura, more or less partial or general, to parts or the whole of the trisplanchnic system; the latter, by its extension through the sacral nerves to the spinal marrow.

Hypochondria and chlorosis, though different in origin, are alike in many symptoms, such as the gastro-intestinal neuroses, those of the arterial system, bizarre anomalies of innervation, etc. But in each the symptoms have modes, co-ordination, and very special characters.

To restrict ourselves to what concerns the digestive apparatus, we will remark that in hypochondria, these neuroses, considered by themselves, consist chiefly of dyspepsia, anorexia, epigastric anxiety, and all the functional disturbances which belong to the disease; also that, in relation to the economy, they are associated with egoism, exclusive pre-occupation with self, a profound, active, restless and devouring sadness, and finally cachexia and emaciation.

In chlorosis, on the contrary, these neuroses, considered by themselves, consist chiefly, independently of the epigastralgia, of depraved appetite, bulimia, canine hunger, etc.; while, as respects the rest of the system, they go with indifference, apathy, torpor of ideas and feelings, and finally, cachexia without emaciation.

In each case there are anæmia, arterial bruits, asthenia, an absence of all appreciable phlegmasia. Does it not seem as if the same treatment would be good in each case? Yet, in the one, iron succeeds; in the other it always fails, and often does harm.

In beginning these remarks we proposed to study the laws of analeptic tonic medication by three separate inquiries, subordinate the one to the other. We have now made the first, which was intended to answer the question, how nature generally, in producing nervous disease, deviates from the physiological condition. We shall now attempt to solve the two others together, on account of their mutual dependence.

We wish to know from what conditions that physiological state results, and by what circumstances nature is aided to return to order and equilibrium. From this very Hippocratic study we shall deduce the most solid therapeutic rules.

We have said with Hippocrates, and it cannot be too often said: "the blood is the calmer of the nerves" Sydenham fully understood and fertilized this truth. He made it the leading thought in his precious dissertation on hysteria. All his views of the immediate nature of this disease, all the fundamental therapeutic indications which his vast and enlightened experience throws out, are faithful reproductions of it.

This great physician ("Op. Med.," t. I., p. 264), with his well-known inimitable expression of truth and candor, relates how, being called to a patient whose doctor had bled and purged him repeatedly and kept him on strict diet, on account of the violence of the fever, he declared that the singular nervous symptoms formed no part of the previous disease, but were solely due to lack of food—convalescence having already commenced. This diagnosis being established, the treatment was self-evident;

“ac proinde,” says he in conclusion, “suadebam ut pullum gallinaceum assum in prandium juberet parari, et simul vinum modice hauriret: quo facto et carnibus deinceps moderate vescens, nunquam deinceps fletum hunc convulsivum passus est.”

It is in the blood that the animal spirits (to use Sydenham’s expression) are regenerated.

When the blood is not sufficiently nutritious to feed the nervous system with the elements which it is constantly expending in all the acts of life, that system falls into a state of erethism, and ceases to be in harmony with its physiological stimuli—which embrace all the external and internal agents that affect man. Hence incalculable disorders of innervation. No impression is felt as it ought to be; no movement or reaction takes place regularly, beneficially. No act of sensation or motion fulfils its physiological end. Hence spasms; for we have defined these pathological phenomena as involuntary sensations and motions, useless and aimless. “Quum enim utrisque (hystericis et hypocondriacis) desit ea spirituum firmitas quæ in robustioribus atque iis quorum facultates JUGI SPIRITUUM VEGETORUM SUBSIDIO ACTUANTUR semper invenitur, impressiones rerum minus gratarum nequeunt perferre, sed vel ira vel dolore subito perciti, perinde sunt irritabiles, etc.”

After recounting the causes which determine hysterical diseases of the nerves, Sydenham, from whom we borrow these phrases, adds in relation to their immediate causes: “Cujus quidem ἀταξίας, origo atque CAUSA ANTECEDENS est debilior dictorum spirituum crasis, sive nativa ea fuerit sive adventitia; unde quavis προφάσει dissipatu faciles sunt, et eorundem systema nullo fere negotio dirimitur.” And among the most potent incidental (adventitiæ) causes of this state he notes the absence of food and loss of blood: “quum e diverso, non alia causa ita constanter pariat hujus modi affectus ac solent dictæ evacuationes.”

In the whole animal economy, the vegetative functions, the acts of nutritive composition and decomposition, are the most important and require the most calm and repose; and nature seems to point to this when she withdraws these acts from consciousness, and executes them in a silence and obscurity which attest the fulness and regularity of their performance.

It has always been known that this interior, hidden or vegetative life absorbed and put in fetters the external life—the active, mobile, unstable and exaggerated manifestations of feeling and movement, which produce the physiological nervous temperament. Matter rules over and stifles the mind; digestion kills thought, etc.; such are the proverbial expressions of this fact.

In pathological states, this is found everywhere. Nervous symptoms are never fewer than when a fever or a grave inflammation exists; and these two phenomena, the most general in pathology, are essentially and specially connected with the functions of nutrition, of intimate vegetable life. If then a sanguine fever supervenes upon primitive nervous symp-



toms, the latter are quieted. Similarly, whatever be the cause of a fever, provided it act directly on the nervous system in such a way as to produce an essential spasmodic state, as soon as the class of nervous symptoms which we are studying appears, the fever ceases, but often to the patient's great risk, for reasons which we have not time to set forth here. The observation of this capital fact inspired that admirable passage in the Coan maxims: "Convulsiones sanat exorta febris acuta quæ prius non fuit; quodsi prius fuerit, exacerbat. Quin etiam prodest urinam albumineam, album ferri et somnos inire;" and this other aphorism: "febrem convulsioni supervenire melius est quam convulsionem febris." In fact, healthy fever and inflammation are regular phenomena, like circulation and nutrition—synergic operations which have an aim, bear evidence to the harmony of the forces, and which, while acting, exclude irregularity, incoherence, want of salutary tendency.

No one has failed to remark the curious and important differences which exist between the nervous system of a person in a long fast or under severe diet, and the same person after he has suitably satisfied his need of food.

If it be a man, we will say in brief, that he will present the most of the symptoms of proper hypochondria. If a woman, we shall see the infinite variety of symptoms which belong to vaporous hysteria; then, after a long alimentary restoration, as soon as the nervous system has received sufficient tone, the fixity and calm of action will be seen to return. The sadness, cowardice, anxiety, misanthropy, egoism of hypochondriacs will give place to the gayety, confidence, general *bien-être*, vital expansion, philanthropy of the sanguine man; the troubles, the nervous mobility, chokings, palpitations, tears, chills, pains—hysteric spasms, in a word—will be replaced by the stability, consistency, force, and functional harmony of the stout country-woman.

As Sydenham observes, hypochondria is hysteria in a man, and conversely: "Si affectiones hypochondriacas vulgo dictas cum mulierum hystericarum symptomatibus conferamus, vix ovum ovo similis quam sunt utrobique phænomena deprehendemus (loc. cit., p. 256); and further on (V., p. 259) . . . . eorum affectuum quos in feminis hystericos, in maribus hypochondriacos appellandos censemus."

If Sydenham had not gone so far as to confound and identify these two diseases, and if his usual reserve had not perhaps prevented his assigning them to different nervous localities in the respective sexes, a difference which establishes all the difference in etiology, symptomatology and therapeutics which separates them, he would have left little to say upon the nature and treatment of these complaints, especially of hysteria.

The condition of the absence of these ills consists in a natural proportion between the nervous and the sanguine systems; an equilibrium between them, dependent on the primordial constitution of each.

If this equilibrium be disturbed at the expense of nutrition, we know the nervous troubles which follow. If it be at the expense of the nervous

system, its functions are as it were stifled, stupefied, stricken with tardiness, weakness, and true narcotism. A fed animal sleeps. A man of great digestive, assimilative, and hæmatogenic powers, who indulges his coarse tastes beyond his needs, is shamefully like an animal. He is heavy, sleepy, without vivacity or aptitude for action, dull in sensibility, thick, slow, and narrow of comprehension. The passions, the violent sentiments of love and hate, have little effect upon him. His nervous system is always asleep—*Sanguis somniferus*.

How often have we seen the insomnia of certain convalescents, reveries, even delirium itself (“*delirium inane, vacuum*”) yield to a broth, or any sort of alimentary tonic! The desire to sleep, often insurmountable, which almost everybody feels after eating, is a plain proof of the calming and even stupefying influence of the blood on the nervous system.

Sydenham has perfectly comprehended and stated this need of equilibrium between the blood and the nerves in order to prevent neuroses. These are his words: “*Illud enim est animadvertendum, quod non nuda spirituum debilitas per se considerata, sed eorumdem debilitas ad sanguinis statum comparatorum ἀναξίας quam patiuntur causa sit. Fieri enim potest, ut infantis spiritus satis firmi robustique sint pro sanguinis ratione, qui tamen debitam ad sanguinem adulti hominis proportionem non teneat. Jam vero, quum ex jugi lactis usu et diæta; quantumvis illa sit cruda et invalida, sanguis mollior et tenerior evadat, si spiritus ab eo nati sanguini pares tantum sint, satis bene se res habet.*”

Let us now reply to the third and last part of the problem; and, to conclude the subject of analeptic tonics, inquire whether in cases where nature cannot restore herself, art may so far imitate the natural operations as to do what nature herself very often can do.

Unhappily, the cases where art is needed to aid nature in restoring the balance between the nervous and assimilative systems are but too numerous. The therapeutic means for doing this are the analeptic tonics, which may be divided into two classes. The first contains the only analeptic tonic in the materia medica, iron, and perhaps the compounds of manganese. The second would include the resources of hygiene, and may be subdivided into direct and indirect remedies, the former including very nutritive ingesta which contain much in small volume; the latter, the acta, circumfusa, and applicata, including suitable bodily exercise or gymnastics, the influence of air, and cool baths.

The last subdivision does not meet the definition we gave of analeptic tonics, for its remedies do not return directly to the blood its reparative elements; but they are such potent auxiliaries, they so clearly arrest vegetative life and regulate the organic functions, that they cannot be overlooked. Furthermore, they are sometimes called upon to fulfil the indications of tonic analeptic medicine, as we shall show directly.

*Martial preparations.*—Sydenham (l. c.), having stated the symptoms of hysterical affections, and given his opinion as to their remote and di-



rect causes, passes to treatment, of which he lays down the foundations in these words:

“Ex omnibus quæ nos hactenus conguessimus abunde mihi constare videtur præcipuam in hoc morbo indicationem curativam eam esse, quæ sanguinis (qui spirituum fons et origo est) corroborationem indigitat; quo facto spiritus invigorati eum servare possint tenorem qui et totius corporis et singularium partium œconomiae competit.”

What agent does he resort to to fulfil this fundamental indication? To the preparations of iron: “Ad sanguinem confortandum et proinde etiam spiritus ex eo prognatos, remedium aliquod martiale seu chalybeatum ad dies triginta præscribo assumendum, quod aliud non certius his votis respondet.

We need not here insist further on the importance of this remedy in chlorosis, nervous affections, etc.

It is hardly possible to state absolute principles in regard to its contra-indications. In well diagnosed chlorosis, it rarely fails entirely, and is much more rarely harmful. Intolerance is almost always transient, and is overcome at last; and this is to be done by making a judicious choice of forms, and especially suitable formulæ, by skilful management of the doses, by selecting the surfaces which tolerate it best, by interposing days of rest in the treatment, by adding correctives, auxiliaries, etc., etc.

We must be much on our guard against deceitful contra-indications, suggested a priori by the state of the stomach or intestines.

Broussais says (“*Extr. des doct.*,” t. IV., p. 564): “We hear much of the success of iron in chlorosis; excellent, like any other tonic, if the stomach is languid from anæmia; very bad, if the menses are retained by a visceral irritation. We must always judge of it by the irritation, *i. e.*, by the solids.”

How can a man of the experience and weight of Broussais profess that it is indifferent what tonic we give in chlorosis? What! will any tonic we please, cinchona or iron, gentian or iron, oak bark or iron, colombo or iron, equally cure chlorosis? and when we prescribe iron so universally, is it only from routine, tradition, an old relic of alchemistic prejudice which orders us to oppose iron to chlorosis because iron is strength, hardness, Mars, and chlorosis is debility, softness, feminine enervation?

It is rather because the exclusive organicists always have a horror of the remedies which are thought to act directly upon the liquids before affecting the solids; and it is hard to deny this action in the case of chalybeates.

In summing up and formulating the general indications for iron, it seems to us just and practical to say that it is chiefly of use in morbid states which are essentially characterized by inertia and profound deviation of the assimilative force, with impoverishment of the blood and all the consequent symptoms; when these conditions are not sympathetic, have come to pass slowly, and have so perverted the digestive, hæmato-

genic and vegetative powers that these functions are unable to elaborate the food as is required for nutrition, and the principal reconstituents are carried directly into the *secundæ viæ*.

Recalling what is said above, we shall see that this conclusion is deduced simply from the observation of the most important facts, those most characteristic of chlorosis.

We add a few very important contra-indications for the analeptic tonics, and for iron particularly.

The reaction provoked by the mistakes and exaggerations of physiological medicine has gone too far, and often has denied everything when distinctions only were needed.

We have said that gastritis, as it has been described, and we might venture to say, invented by the Val-de-Grâce, was a pathological rarity, and was only seen in cases where it was caused by irritant agents taken in incendiary aliments and in acrid poisons. This is true, except in a few rare cases which we need not mention here.

But does it follow that irritation of the stomach, subacute, chronic and obscure in most cases, is an invention made at will, which must give place to pure and physiological gastralgia, another enormity of our epoch?

No! these shades of gastritis, or, more properly speaking, of gastric irritation, are an excessively common disease, though happily very rare in combination with chlorosis, where iron is so useful.

It is a great pity that they most frequently exist in women for whom analeptic tonics seem perfectly suitable.

In the most of such cases, we find one of the following general conditions, joined to the gastric irritation in question.

Sometimes there is a herpetic diathesis, proved by darts of dermatoses, previous or coexistent. Whatever the languor and the poverty of the nutritive functions, however great the anæmia and cachexia, iron almost always fails.

In other cases these women have been formerly scrofulous. The classic signs of this vice have mostly ceased; they are no longer called scrofulous, but debilitated and lymphatic. Their periods are bad, they can digest nothing. Almost all have subacute or chronic gastritis, which the enemies of physiologism exaggerate to dyspepsia or gastralgia, without reflecting that acquired and simple gastralgia is extremely rare, except in chlorosis, anæmia, and nervous rheumatism.

Before puberty and menstruation, gastritis and enteritis are very common in scrofulous young women or strumous and lymphatic little girls. This is plain from the state of their tongues, their lips, and the difficulty of digestion. The anti-scrofulous remedies, all excitants and tonics, do them decided harm. It is singular how iron disagrees with the scrofulous, or succeeds but partially. It is due to the fact that in the scrofulous diseases, which differ from chlorosis as one cachexia does from another, as one species of anæmia from another, irritation (scrofulous) is always imminent, and is very easily excited by iron; as Broussais says, they are



made of a very irritable material, because their diathesis produces many morbid products, the formation of which often depends upon special irritations and suppurations.

These patients cannot take iron, except when the deposits of scrofulous matter are forming in them by the laws of physiological secretion without irritation or scrofulous phlegmasiæ; as is seen in certain phthisical patients whose lungs are stuffed with tubercles without any pulmonary phlegmasiæ.

A large number of morbid nervous symptoms annoy women who seem most suited for treatment by analeptic tonics and iron; yet these persons cannot bear it—it even does them harm. In these cases there is almost always some diathesis which makes them irritable, and complicates their anæmia with a morbid principle which iron cannot conquer or neutralize. Gout, rheumatism, those various diatheses which the class of darts imperfectly includes, are the most frequent obstacles to the success of ferruginous treatment. A cause which very often interferes with success, in spite of apparent reason for their use, is amenorrhœa in non-chlorotic women. In this case the stomach is almost always irritated; organic injury is always imminent or existent; iron fatigues quickly, fails at once, or is apparently of no use.

In all these cases the insufficiency or harmfulness of iron is natural and easy to explain. Iron is an analeptic and not an alterative. There is a cachexy in these persons, but of a very special kind—rather the effect of a diathesis which is incessantly fruitful of irritation than a simple defect of proportion among the constituents of the blood. The blood is poor, but it is vitiated by a morbid principle, and the chalybeates are suitable only for repairing a simple insufficiency, uncomplicated by any diathesis.

As to the chlorosis, we should not expect always to cure it, permanently and perfectly, with iron. By iron you give the blood plasticity and coloring material; the patient regains color and strength. The treatment is suspended, and in a few months all the symptoms of chlorosis appear in order. The blood is artificially enriched, but the woman is unable to maintain the richness without aid. Marriage takes place, and sterility, dyspepsia, menorrhagia, leucorrhœa, low spirits, palpitations, backache, constipation, sick headache, etc., show a weak constitution and a life forever embittered by suffering and by unfitness to fulfil the duties of maternity. If a woman in this state of predisposition to chlorosis, often irremediable, has a child, affections of the womb, as ulceration of the neck, prolapse, metrorrhagia, dyspepsia, infiltration, dry cough, general dilapidation, emaciation, nervous fevers, various neuralgias, etc., too often reduce the poor wretch to an unendurable and cruel state of ill-health, which at the turn of life sometimes ends in fatal organic diseases, more frequently in a premature and cacochymic old age, and most rarely by a metasyncrisis and a salutary revolution.

It is not enough then to put the ear to the carotids and prescribe iron.



Yet such is to-day the sum of the diagnosis and treatment of this affection. And those empirics—the professors of exact medicine who do no more than that—proclaim themselves as the representatives of progress!

In the cases just mentioned, iron does act, but inadequately; and a cure must depend on the combination of other remedies.

*Substantial diet.*—*Gymnastics.*—*Cool baths.*—These agents are potent adjuvants of the iron treatment in chlorosis and hysterical nervous disorders. We must now show in a few words the reasons which sometimes induce us to use them exclusively.

Iron, as above stated, is most proper in diseases where the blood has lost its excitant and plastic qualities slowly and by a gradual perversion of the visceral functions; also whenever the preparatory acts of vital chemistry are not performed, and cease to react advantageously upon the food so as to form assimilable principles, as is seen in chlorosis.

The alimentary tonics are good when the assimilative functions and the blood have suffered inertia and poverty for a short time, as after and during convalescence from acute febrile diseases which have imposed an active and rapid labor upon the alterant forces, or a long and trying period of coction, especially in children and vigorous adults.

Strict diet must be observed, while the alterant forces have to perform a necessary pathological task. To introduce food would then be asking of these forces an excess of nutritive action, which would check either the pathological or else the reparative elaboration. Hippocrates has said as much in his aphorisms (the 10th of section 2): “*Impura corpora quo magis nutriveris, eo magis lædes.*”

The morbid alterant process once at an end, restriction does harm; it causes debility and nervous troubles, which do not occur while the vital chemical forces are employed in digesting and concocting pathological products.

In humoral diseases, diet is much more needful than in nervous; and a proof that the acts of the alterant forces are exclusive of the nervous phenomena, aberrations of sensibility and motility, in short, spasms, is found in the fact that in the acute humoral or febrile diseases where these pepsic forces (to use the expression of Hippocrates) are very active, there are no spasms, disorders of the nerves, and that if they appear, it is a sign of the suspension of the pathological labor and of irregularity in the course of the disease.

The food given in convalescence from acute disease seemed a very important matter to Hippocrates, who gave much attention to it in a special treatise (“*De vic. trat. in acut.*”), and in several aphorisms of the first section.

Towards the decline of acute fevers, severe inflammations, exanthematous pyrexiae, great sagacity is required to decide when to begin to give food. New symptoms then often occur, fever persists or appears, etc., which opportune feeding immediately puts an end to.

Galen knew that after certain fevers or intense acute diseases which



had much weakened the patient, a nervous fever arose which was calmed by analeptic tonics. “*Equidem ita febricitantes aliquos ostendi tibi maxime ex iis qui e longo morbo convalescerant, quorum quum uni forte fortuna occurrissem qui mox ante horrescere cœpisset, ut rem exposuisset, dato ex vino diluto pane, continuo horrorem inhibui; atque ut semel dicam, quibus incipientis adhuc accessionis aderant symptomata, iis omnibus panem ex vino diluto esculente mature exhibens, horrorem statim inhibui et febrem prohibui.*”

The presumed duration of the disease, the losses the patient has suffered, which have reduced him, so to speak, to the outlines of his figure, his habits, the form of the disease, whether remittent, intermittent, or continuous, must in general form a guide to prescribing the diet. The following aphorism of Hippocrates will sum up a part of these motives: “*Considerare oportet etiam ægrotantem, num ad morbi vigorem victu sufficiet, et an prius ille deficiet, et victu non sufficiet, an morbus prius deficiet et obtundetur.*”

Without enumerating all the cases where alimentary tonics are required, it will suffice to say generally that they are called for whenever the assimilative force and the blood have been rapidly enfeebled by abundant losses, or by diseases during which the acts of vital chemistry have been occupied with a pathological labor which demanded a protracted strict diet; and that they are powerful to arrest all the symptoms arising from these conditions, when the digestive and hæmatogenic functions retain their physiological power.

The effect of food in chronic diseases belongs to the subject of regimen and hygiene, and we need not speak of it at length. It is obvious that in these affections, as soon as the functions begin to be regular and normal in their mutual action, the alimentary tonics acquire considerable curative power, especially when aided by gymnastics, etc., of which we will now say a few words.

“The exercise of the locomotor muscles,” says Broussais (*Proposit. 373, “Ex. des doctr.” t. I.*), “is the best means of destroying convulsive mobility. It displaces the visceral irritations (the vicious latitude which Broussais gives to the word irritation allows us to take it as meaning here pains, spasms—in a word, neuropathy) by consuming a superfluous activity, and by calling the forces towards nutrition and the exhalant and secretory tissues.”

This proposition contains a profound truth, too much overlooked or despised by physicians who would suppose their cure a bad one, and themselves unworthy of their title, if they had cured without the aid of pharmacy; a truth equally despised by patients, in whose opinion the physician sinks, when he has conscience enough not to rack them with his drugs, and who think that their ills are slighted, or that a cure is despaired of, when hygiene forms the only means of cure.

It is a proverbial saying that mental labor is more fatiguing and exhausts the economy much more than that of the body; but we do

not give a physiological reason for this seemingly extraordinary difference.

Does the man of the closet, the meditative writer, living from morning to evening in the immobility and silence of study, expend more vitality than he whose labor demands continual bodily movement and muscular activity in the field? No; but if the latter expends much, he repairs much, while the former expends without repairing.

Too continual and intense exercise of thought keeps the man of letters in a continual nervous state. The vital movements, instead of being expansive, fruitful, imparting activity to the organic processes of vegetable life, such as digestion, circulation, hæmotosis, secretion, etc., are compressed, chained, and the assimilative force languishes; hence the frequency of nervous diseases in this class of men. Their labor, instead of increasing the functional activity of the nutritive organs, is an incessant cause of languor and perversion of these organs, and soon the cause is increased by its effect. Imperfect digestion, whence want of appetite; no desire for alimentary repair; difficulty of secretion, exhalation, discharge; inertia of the respiratory functions; deficiency of muscular fatigue; indigestions; excessive cerebral activity; and, as a result of all combined, loss of sleep, that beneficent tonic.

Thus, without fatiguing himself, without making a legitimate expenditure of life which might cause a need for salutary repair, these persons forbid their system the satisfaction of its most important demands, by weakening and diverting the acts which preside over the fulfilment of its wants.

The contrary is the case with those who do bodily labor in the open air. They expend an enormous amount of vitality, in return for which they get a keen and genuine appetite which they satisfy to purpose and for legitimate needs. Their hæmotosis is powerful, their circulation active; the secretions and exhalations abundant and of good quality; their sleep profound, natural and restorative.

In such persons the acting forces (to use Barthez' expression), in constant and well proportioned exercise, far from being exhausted, simply increase the sum of radical forces, in which they constantly find new power of action. We have seen that the nature of analeptic tonics is to invigorate the radical forces of the system. "The energy of the radical forces increases in a ratio compounded of the intensity of the action of the forces acting in each function, and the constancy of the mutual relations habitually existing among all the functions. . . .

"The repeated agitation of the entire body in suitable exercise, and the repeated impressions of fresh air, excite the radical forces of the vital principle." (Barthez: "Nouveaux éléments de la science de l'homme," t. II., p. 168.)

There are women, subject to disorders of the nerves, in whom neither iron nor alimentary tonics can recall the nervous functions to order; they are chiefly such as are subject to convulsive hysteria, with some who are



plagued with spasmodic and vaporous hysteria. The only useful tonics for these are bodily exercise, kept up with great perseverance, and well directed gymnastics.

There are other women of vigorous and sanguine constitution, subject to all the hysterical spasms and the nervous ills chiefly attributed to delicate and puny women. For these, the only therapeutic indication is to consume by muscular exercise their superfluous activity, and to direct their forces to nutrition and to the exhalant and secretory tissues, as Broussais has it.

The species of tonics which we are now speaking of is perhaps the only one suitable for hypochondriacs, who hardly ever can support the tonics of the materia medica on account of the excessive irritability of their gastro-hepatic system, which sometimes becomes a degree of irritation and chronic subinflammation, especially when the malady is old. We know what confidence Sydenham placed in horseback exercise in these diseases: "*Æt vero nihil ex omnibus quæ mihi hactenus innotuere, adeo impense SANGUINEM SPIRITUSQUE FOVET FIRMATQUE ac diu multumque singulis fere diebus equo vehi. Quid quod SANGUIS perpetuo hoc motu indesinenter agitatus exagitatus ac permistus quasi renovatur ac VIGESCIT.*"

The same end, again, reached by different means. It is still analeptic tonic treatment, with the immediate object of restoring the nutritive forces.

But much method and attention are required in order to give these tonics in suitable form and dose. Not only ought muscular exercise not to exceed the limits of the individual strength, but it is indispensable that they be regulated with respect to the sort of affection for which they are used. They ought to occupy and call into activity all the functions of relation and to be in harmony with an intellectual or moral aim; to be proportioned to the sleep and food, and seconded by suitable temperature and clothing: great persistency must be used, and no discouragement felt because no benefit is felt at the outset, since all hygienic remedies have a progressive, gentle, slow, insensible, but yet durable and profound influence.

"The increase of radical force which is produced indirectly by an exercise of the functions conformable to health, demands our chief attention. It is always in a ratio compounded of the intensity of the action displayed by the acting forces in each one of the principal functions, and of the maintenance of the mutual relations of activity among these functions which habit has established in the form of health which belongs to each person.

"The radical forces thus reproduced (by bodily exercise) offer less resistance to the causes of disease in persons who habitually lead an active life, and in those who work hard nearly every day" (Barthez).

Cold baths are another sort of tonic, and a very potent sort, through the calm which they impress upon the nervous system—a general, uniform, equal calm, soon followed by an excentric, general, uniform reaction, full of harmony and spontaneity. This happy reaction, aided and sustained



on leaving the bath (which never should be prolonged in these cases, but should last eight or ten minutes in water cooled gradually to  $25^{\circ}$ ,  $24^{\circ}$ ,  $20^{\circ}$   $= 77^{\circ}$ ,  $75^{\circ}$ ,  $68^{\circ}$  Fahr.) by dry or aromatic frictions, massage, a fortifying meal whetted by cordials, etc., is indicated by a physiological fever, which is the most powerful antagonist of nervous maladies.

A general fever of this sort silences the nervous mobility and extinguishes the sympathies, far from arousing them, as the physiological school pretends. "The fever overwhelms," is a popular expression upon which physicians have not reflected sufficiently. Fever is the type of salutary reactions. It is the leading form of disease.

When to the tonic effect of cold we can add massage produced at the same time by the douche, we get at once a double action, which gives to the nervous system, the capillaries, and by sympathy to the whole economy, a durable, fortifying impression which is to be preferred, in certain lymphatic and irritable subjects, to the internal tonics which they usually bear so poorly. We think the cold douche, in the hands of a prudent physician, called upon to play an important part in tonic reconstituent treatment. Dr. Fleury, who has specially studied the influence of this precious remedy, sums up his experience in the following propositions, which are based on principles like our own, and form a natural part of the present statement.

1. Stimulant cold douches should be placed in the first rank among reconstituent remedies, in virtue of their action upon the capillary circulation, and consecutively upon the composition of the blood, calorification, nutrition, and innervation.

2. More rapidly and surely than any known hygienic and pharmaceutic remedies, they modify the lymphatic temperament and substitute an acquired sanguine temperament. This happy influence seems to have been attributed to a double action: one upon nutrition and the composition of the blood, the other upon the capillary vessels, the vital contractile powers of which are so aroused as to cause blood-globules to penetrate vessels which previously admitted only serum. Cold douches further exercise a very favorable influence upon the development of the body and the muscles, and the establishment of menstruation.

3. Five young girls, from eighteen to twenty-two years of age, for several years subject to confirmed, grave, rebellious chlorosis, which had resisted all known hygienic and pharmaceutic modifiers, were treated by cold douches; all recovered; the duration of treatment was seven months in the longest case, two in the shortest, and four in the average.

The effect was always the same, at first appearing in the digestive and muscular apparatus, then in the nervous system, and lastly in the blood and circulation.

4. Idiopathic anæmia and anæmia in convalescents disappear quickly under the influence of cold douches, owing to their action on digestion, nutrition, and the muscular system—an action which aids the restoration of blood better than that of any other remedy.



5. In symptomatic anæmia connected with certain uterine affections (displacement and engorgement), with old obstinate neuralgias, certain neuroses, and hypertrophy, cold douches have a double curative effect, curing both simultaneously, and often the one by means of the other.

6. In anæmia with abundant and repeated hæmorrhage, cold douches have a very remarkable double action; by producing renovation of the blood, and combating organic congestions, they diminish or arrest the hæmorrhage which had been aided by the anæmia they produced; thus helping the patient to break the vicious circle which is so often seen in practice.

7. In anæmia in a curable affection which is not influenced by cold douches, the latter render important service by improving the patient's general state and thus rendering the treatment and the cure of the primary affection more easy.

8. In anæmia joined to an incurable affection, cold douches are often very useful; they have remarkably improved the condition of several patients with pulmonary emphysema, organic affection of the heart, cancer, and abdominal tumors.

We close this part of our treatise by observing, first, that all those organic reactions which are effected by the most general and rudimentary acts—by the functions which M. Récamier calls common vital acts—such reactions as fever and inflammation, are the most legitimate, the most calculable, the most critical, the most salutary.

Those reactions of the system which are effected by special acts and without involving the common vital functions, are characterized by directly opposite traits; such are all the nervous diseases; they are incalculable in their course, incoherent in their symptomatic expressions, without critical tendency, incapable of furnishing criteria for judging themselves.

Thus the former, dependent on the common vital functions shared in by every living being, occur with harmony, unity; have calculable periods, a term to which one can assign a date and a mode.

The latter are manifested by anomalies in the action and influence of the special functions (those which exist only in certain animals), go on without order, without harmony, have nothing calculable, persist indefinitely, and cannot be foretold in the succession of their symptoms, or in their modes of termination.

Nevertheless, observation informs us that these two classes exclude each other, and that a substitution of the first for the second is desirable, because the most natural solution—a result, as we have seen, of their respective characters. (For a fuller development of these ideas, see the inaugural thesis of one of us: “*Essai sur les lois de la force médicatrice*,” Paris, février, 1835, No. 36.)

The analeptic tonics make the common vital functions, the force of assimilation, predominate in the organism, and consequently cause the most calculable, legitimate, and salutary reactions.

Therefore, they are the true and natural remedies for the nervous affections which we have here mentioned.

The last argument which we shall bring in support of this capital therapeutic law is one which we have learnt from a thousand daily observations, to wit: that constitutions characterized by predominance of the assimilative force are not subject to nervous diseases, but are easily put into a well-marked fever in all the morbid reactions they have to endure; but those of a nervous temperament, and much subject to spasms or diseases of the nerves in either sex, rarely experience fever and seldom react by pyrexias.

If to this be added what is to follow under antispasmodic medicine, in reference to palliation of essential nervous diseases, we dare to hope that we shall have given the fundamental principles for the treatment of this numerous and important class of disease.

Sydenham felt clearly the need of having at his disposal two classes of resources in treating these diseases, and could employ the antispasmodics simultaneously or alternatively, as is seen in the following: "*Quoties vero paroxysmus invaserit, si tale aut tantum sit malum ut inducias ferre nolit, donec sanguine et spiritibus corroboratis, quasi per ambages sanari possit, confestim ad remedia hysterica ista confugiendum est, quæ odore viroso ac gravi, spiritus, ut dixi, exorbitantes ac desertores in proprias stationes remandant, sive intra corpus sumantur, sive naribus admoveatur odorando, sive externis applicentur; cujus modi sunt asa-foetida, galbanum, castoreum, spiritus salis ammoniaci et quicquid est denique quod odorem tetrum admodum ingratumque spirat*" (Syd: "Op.," t. I., p. 276.)

It were to be wished that all the diseases of nerves were included in this class which we have described. But unfortunately, the neuroses, diseases without material, like the phlegmasia, the diacrisis, etc., are the morbid manifestation of all known diatheses, and to these tonic treatment is rarely applicable, while iron is usually hurtful.

It is also very necessary to recollect what we have taken pains to show, by pathological arguments which we perhaps have carried too far, namely: that anæmia or cachexia has its species, like inflammation; and that, as there are scrofulous, venereal, gouty, dartrous phlegmasia, etc., there are anæmiæ or cachexiæ which are symptomatic of all these diatheses. In these anæmiæ, also, iron is almost always contraindicated. Unless, then, we wish to compromise the general principles laid down in this chapter, we must apply them only to the class of nervous diseases and to the sorts of anæmia which we have carefully distinguished.



## CHAPTER II.

### ASTRINGENTS.

#### TANNIN.

WE shall speak very briefly of the employment of pure tannin, and more at length of remedies of which it forms a considerable ingredient.

From its solubility and the ease with which it is given, it is used in all cases where astringents are recommended.

Internally, in chronic diarrhœas, the dose is 1—5 centigrammes (gr. 0·15.—0·75) for children, 5—50 centigrammes (gr. 0·75—7·5) for an adult. In severe hæmorrhages, 10 centigrammes (gr. 1·5) every two hours, till four grammes (60 grains) have been taken. In chronic blennorrhagia, pulmonary and uterine catarrh, in the dose of 25—50 centigrammes a day, for one or two months.

M. Charvet, professor at the secondary school of medicine at Grenoble, has used tannin with advantage in the sweating of phthisical patients, given in the dose of 2½—10 centigrammes (0·4—1·5 gr.) during the 24 hours, usually in the evening, and with opium.

M. Mialhe, guided by his chemical theory of albuminuria, proposed to combat this affection with tannin. It has been thus employed by several, not without some advantage. M. le docteur Garnier and Dr. Tilling, of the province of Venice, among others, have shown that in the high dose of 2—4 grammes (30—60 gr.), associated with cinchona, it modifies specially and notably the anasarca which accompanies albuminuria. Besides, the urine itself is seen to become more abundant, and by degrees to regain its physiological character; at the same time the patient regains appetite and strength; in a word, the chief symptoms improve quite rapidly, sometimes from the first days. But, to avoid mistakes, we must add that these good results are scarcely obtained except in acute, or at least quite recent, albuminuria, that is, where the lesion of the kidney is slight or superficial; while, in an advanced case of Bright's disease, tannin fails or is not lasting in its effects.

M. Chansarel, of Bordeaux, whose father made most interesting experiments on tannin, published in the *Bulletin médical de Bordeaux* (octobre, 1810) a memoir on its therapeutical use. This paper (perhaps a trifle exaggerated in its claims) places tannin among the most useful of drugs. In addition to the curative powers above mentioned, he speaks of some which are still more precious. He found that it cured intermittent fevers as well as sulphate of quinine; for which purpose he gives a progressive

dose, rising from 60 centigrammes to 2 grammes (9 to 30 grains) in 150 grammes (nearly 5 ounces) of water and mucilage of gum arabic. Of this solution the patient takes a dessertspoonful every three hours during the intervals of the disorder. This only confirms what is said by Pezzoni ("Histoire de la Société de médecine pratique de Montpellier," 1807.)

Dr. Leriche, of Lyons, has very lately demonstrated beyond a doubt the excellent effects of tannin as a substitute for cinchona in intermittent fevers. These results are quite in accord with our views regarding the mode of action of cinchona or sulphate of quinia as an antiperiodic; that is, in our view this property in tannin (though exaggerated by these different authors) may well be only the consequence of the tonic astringent and reconstituent properties which it possesses in a very high degree.

M. Chansarel also prescribes it as an anthelmintic: "Children who have taken it in syrup or draughts or injections, in the dose of 30—50 centigrammes (4·5—7·5 gr.) have been perfectly cured, and have passed a large quantity of worms" (*Ibid*).

Finally, we must not omit its virtues as an antidote. According to M. Chansarel, it is a certain antidote in poisoning by verdigris and other salts of copper, lead and the saturnine preparations, tartar emetic and the preparations of antimony, cantharides, opium and its compounds, conium, hyoseyamus, stramonium, the organic alkalies in general, mushrooms, etc. (Chansarel: *Journal de la Société de médecine de Bordeaux*, 2<sup>e</sup> série, t. VIII., p. 316.) Without sharing in this enthusiasm, we yet recognize very gladly that it has evident value in the above cases of poisoning.

The astringent property of tannin has suggested to M. Woillez its use in the catarrhal element of diseases of the respiratory passages. He says that, when given in pills of 0·15 grammes ( $2\frac{1}{4}$  gr.) until sixty per day have been taken, it promptly affected acute bronchitis, which seemed to be passing off too slowly. In these cases the quantity of sputa expectorated and of râles heard diminished remarkably from day to day. M. Woillez, thinking that this effect was produced by moderating the bronchial circulation, was led to use tannin in pulmonary bronchial congestion, and particularly in typhoid fever. He has such confidence in the action of tannin in relieving congestion of the lung that he considers the remedy a touchstone to diagnose phthisis, since after the disappearance of congestion, the bruit which remains must all be laid to an organic affection. But this test is scarcely possible except in atonic phthisis, for (as M. Woillez admits) tannin aggravates febrile and erethic phthisis (*Bull. de thérapeutique*, 1863).

Externally, as a gargle, the dose is 4 grammes (60 gr.) to 250 grammes (8 oz.) of water, in chronic inflammations of the buccal and pharyngeal mucous membrane. In powder, like snuff, for rebellious epistaxis and acute or chronic coryza. In injection, in vaginal and urethral blennorrha-



gia, in the dose of 10—50 centigrammes (1·5—7·5 gr.) to 30 grammes (1 ounce) of vehicle. As a rectal injection, in proctorrhœa, chronic diarrhœa, chronic dysentery, in the dose of 1—1½ grammes to 500 grammes of water (15—22 grains to 16 ounces). In collyria, in catarrhal ophthalmia, 10—20 centigrammes to 30 grammes of water (1·5—3 gr. to the ounce). In ointments, for local treatment of dartres and fissure of the anus. With glycerine, it has succeeded in certain rebellious forms of herpes, especially h. præputialis. Plugging the vagina with a mixture of glycerine, 80 grammes (2½ oz.) and tannin 20 grammes (5 drachms) (Demarquay), has been found very useful in acute and chronic vaginitis. The plug is to be renewed every twenty-four hours. The tannin ointment has just the same virtues.

(Glycerate of tannin.)

R. Powdered tannin.....10 grammes=154 grains.  
 Glycerate of starch.....50      “      =770      “  
 Mix with care.

Tannin, employed locally like alum, has recently been lauded by some in the treatment of croupous and even diphtheritic angina. But it is more useful in œdematous laryngeal angina, when water strongly charged with tannin is thrown in vapor into the throat, by a pulverizer.

To lessen the cutaneous inflammation in erysipelas, we are accustomed to spread with a pencil upon the affected part a layer of a solution of tannin 20 grammes ( 3 v.), camphor 40 grammes ( 3 x.), sulphuric ether 100 grammes ( 3 xxv.). The ether in evaporating leaves tannin and camphor in powder on the skin, which acts as a sedative and resolvent.

As an epithem it is applied to the skin to contract the tissues, resolve nævi materni, etc. Associated with benzoin and applied to the pustules of small-pox from the outset, it is proposed by M. Homolle as an abortive, especially for the face, to prevent disfiguring cicatrices.

Finally, M. Mialhe uses a solution of tannin to show in the urine a species of albumen which is not precipitated by nitric acid, called albuminose.

M. Debauque, a pharmacist of Antwerp, was the first to show that iodine is soluble by tannin. Following this indication, M. Boinet made it a general rule to use as a vehicle for iodine some astringent syrups which contain tannic acid, such as the antiscorbutic syrups, syrups of horse-radish, gentian, walnut, cinchona, bitter-orange peel.

*Combination of iodine with tannin, or liqueur iodo-tannique.*—A direct association of these two bodies has been lately effected by MM. Socquet and Guilliermond (of Lyons). In this combination iodine is soluble, is deprived of its caustic properties and its smell, without losing any of its therapeutical virtues. It is claimed that, in this form, the iodine is much more active than in iodide of potassium, and presents none of

the inconveniences which exist when iodine is diluted with an inert substance.

The authors have obtained by this chemical composition two solutions: one called neutral, because starched paper indicates no trace of iodine, which is capable of dissolving, in addition, a quantity of iodine equal in weight to half the tannin used; the second is the result of this addition, and is called ioduretted iodo-tannic solution.

Tannin from rhatany has been preferred by the authors because it has less astringency than quercitannin; the latter is reserved for external use.

The syrup prepared from the iodo-tannic solution is very limpid, of a splendid red color, and agreeable to the taste; 30 grammes of syrup contain 6 centigrammes of iodine (2 parts in 1,000). This amount (nearly  $\frac{5}{8}$  i.) is the dose to begin with; it may easily be increased to twice that quantity per day.

The solution for external use, prepared with quercitannin, contains 5 grammes of iodine to 100 of vehicle.

We will not mention the numerous advantages attributed to this very rational combination. It is, however, a very recent importation, is not well defined chemically, and we have no experience of our own to enable us to decide upon its merits.

We must add that M. Barrier, of Lyons, has used the iodo-tannic solution externally, in injections for fistulæ resulting from cold abscesses, and in hydrocele, in which he states that he has obtained as good results as from tincture of iodine.

He has also employed this agent as a coagulant of the blood. Injected into varices, it has produced a less prompt action than perchloride of iron, but very analogous. Here is a subject for fresh surgical experiment (*Gazette hebdomadaire*, mars, 1854).

M. Desgranges, of Lyons, has continued these experiments on the liqueur iodo-tannique, and attests its astringent and hæmospastic property, which he attributes exclusively to the tannin, and not to the iodine. Both are taken up by absorption, while the perchloride is not absorbed. He concludes that this compound is likely to be as useful in surgery as in medicine (*Gazette médicale de Lyon*, mai, 1854; *Union*, 1854).

*Tannate of Quinia.*—This compound is a new preparation, introduced by M. Barreswil.

Berzelius foresaw the advantages of this compound, arguing from the theoretical idea that, while quinine is the chief active ingredient in cinchona, the tannin contained in the bark must have a share in the effect.

A commission named by the Academy, and reported by M. Bouvier, subjected this new compound to numerous experiments, and found that it possessed a power at least equal to that of sulphate of quinia, both in intermittent fevers and in acute rheumatism and certain neuralgias.

In addition to its antiperiodic and sedative, or contra-stimulant properties, which it shares with sulphate of quinia, certain quite special virtues have been attributed to tannate of quinia.



The first of these is that the tannate is much cheaper, and for this reason is suited to country practice. A second advantage is that it is very much less bitter; and, finally, it does not irritate the digestive organs as sulphate of quinia sometimes does.

The dose has been stated as nearly the same as that of the sulphate; but later trials show that the dose ought to be a little larger, in order to act surely in intermittents.

It is said to be not only an excellent febrifuge, but a very potent tonic. In the dose of 20 centigrammes daily (3 grains), it is claimed to be one of the most valuable and meritorious "reconfortants." It has been proposed as a remedy for phthisical night-sweats, in which case it would be indicated by its double quality as tonic and antiperiodic.

With all these advantages, some of which are real, and some require to be better verified, one objection is made to the tannate, namely, its amorphous and insoluble form, and the consequent facility with which it may be adulterated.

A fresh study of tannate of quinia must be made; and in order to procure it of a definite composition, the admirable directions of Regnault, lately presented to the Academy of Medicine, may be followed :

1. The pure tannate of quinia cannot be obtained by simple precipitation of the acetate of quinia by a solution of gallo-tannic acid (tannin from gall-nuts), a procedure very generally recommended.

2. The compound resulting from the reaction of tannin upon the basic and neutral sulphates of quinia retains a portion (about 3 per cent.) of sulphuric acid, which cannot be removed. It forms a sort of sulpho-tannic varnish, different in composition and properties from the tannate proper.

3. When basic sulphate is dissolved by the help of acetic acid (method of Barreswil), the precipitate is also sulpho-tannic. Owing to the presence of acetic acid, the water used to wash this substance retains about one-fifth of the total amount of tannate of quinia; this fifth may be recovered by neutralization with bicarbonate of soda.

4. The formula of the Strasburg pharmacopœia should not be adopted, as its proportions render it impracticable, and it requires an amount of quinia nearly twice that found in tannate prepared chemically by double decomposition.

5. The method described in my memoir gives a regular and identical result; the directions are as follows: into an aqueous solution of acetate of quinia such a proportion of purified tannic acid is poured that the precipitate formed at the beginning of the process is redissolved entirely. This liquid, carefully neutralized by bicarbonate of soda, throws down tannate of quinia, which is easily washed and of uniform composition.

6. As thus prepared, tannate of quinia contains on an average 20·5 per cent. of quinia, and corresponds to a definite compound  $C_{40} H_{24} N_2 O_4 - 2 (C_{54} H_{22} O_{34})$ , in which tribasic tannic acid is in excess relative to the quinia, a diacid alkaloid.



7. The physical coefficient of solubility of tannate of quinia in water cannot be determined, because, under the chemical influence of water, the salt slowly decomposes into gallo-tannic acid, which dissolves a small part of the tannate, and a more basic tannate which remains dissolved.

8. Tannate of quinia is quite soluble in aqueous solutions of the organic acids, which do not precipitate the tannic acid from these solutions. It is not soluble, at least not immediately, in the mineral acids, which have the property of producing in liquids containing tannin those insoluble deposits studied by Strecker.

9. In physiological and therapeutical experiments, it is well to note that 1 gramme of neutral sulphate of quinia is equivalent to 3.50 grammes of pure, dry tannate.

M. Vulpian is now comparing the properties of pure tannate with those of the sulpho-tannic combinations which have often taken its place in ordinary medicine. The results will be presented to the Academy.

*Tannates of lead, zinc, bismuth.*—Tannate of lead, as used in medicine, is a bitannate obtained by precipitating a concentrated infusion of gall-nuts, or better, a solution of tannin by liquid acetate of lead.

Autenrieth and M. Yoth have praised it in the treatment of gangrenous ulcers. M. Ricken has prescribed it with success, to cicatrize the bed-sores of phthisical and typhoid patients.

Tannate of zinc has been used under the name of "Sel de Barnit," in the treatment of gonorrhœa.

A tannate of bismuth has been introduced by M. Cap, who obtains it by dissolving, in water acidulated with nitric acid, 44 grammes of crystallized nitrate of bismuth, and precipitating by a slight excess of soap-maker's lye. The precipitate is collected and washed, and triturated in a mortar with 20 grammes of tannin; a paste is made with water, which is placed on a cloth, washed, and dried.

It may also be obtained by precipitation. In spite of the efforts of MM. Aran and Bouchut, who recommended it as a good astringent, it is now almost abandoned.

## OAK-BARK, TAN.

Oak-bark owes all its virtues to tannin and gallic acid.

A very remarkable fact has been observed at the Veterinary School of Lyons. Large doses of oak-bark were given to horses and goats. A horse who had taken 10 kilogrammes in a month (300 ounces Troy), had redder, more viscous, more consistent blood at the autopsy; his body remained two months without giving signs of putrefaction, whereas horses putrefy in a very short time, even in winter, if it does not freeze ("Comptendu des travaux de l'école vétérinaire de Lyon," 1811). Hence the direction to give large doses of tannin internally when gangrene threatens to invade a limb after severe wounds; the principle does not apply to dry gangrene. The mortified parts ought also to be covered with tannin



to arrest the progress of putrefaction. It is for experience to decide how far tan should be given in various forms of typhoid disease.

Porta (*Revue médicale*, t. III., p. 493) has given oak-bark internally in active and passive hæmorrhages. He prescribes it in the dose of  $2\frac{1}{2}$  grammes (38 gr.) daily, which is plainly too little. Topically, the decoction has been used in hæmorrhages, leucorrhœa, blennorrhagia—in a word, in all cases where tannin and rhatany have been recommended.

Lightermen sprinkle their shoes with tan when they leave their work, thus preventing the increase or development of the trouble which they call *grenouille*, which is a softening of the derma with alteration, with cracks and often wasting of the tissues which are much in contact with water. It occurs on the heel, below the tendo-Achillis, etc., especially between the toes; it is easy to see how the remedy acts.

The febrifuge virtues of tan seem very doubtful to us, in spite of what Cullen may have said in his "*Materia Medica*" (t. II., p. 47). As regards the fact stated by Barbier of Amiens ("*Matière médicale*," t. I., p. 328), that in a suburb of Amiens there is a tan-mill where the laborers never have intermittent fever, while those who work at other employments in the neighborhood are often affected, we do not question it, since Barbier affirms it; but since, in other parts, those who grind tan take intermittent fever like other people, we think the immunity in these cases must be due to circumstances which have escaped Barbier's observation.

The acorns of *quercus ilex* are eatable; those of *q. robur* are scarcely eaten except by beasts. But both kinds are used in medicine, after being roasted like coffee; they contain nearly one-tenth part of tannin. They are afterwards ground fine, and from the powder a liquid is prepared as coffee is made, which has exactly the color of the latter, and tastes pleasantly, especially when milk is added. This sort of coffee is very useful for children after weaning, when they have those obstinate non-febrile diarrhœas. It is also useful to persons whose digestion is laborious and who are subject to looseness. In a word, it may be given as coffee to irritable patients whose digestive functions are hindered by a chronic phlegmasia.

#### WALNUT, WALNUT-HUSK.

For twenty years past the leaves of the walnut have enjoyed a high repute, as astringents, tonics, and detergives. But their chief fame has been as an antiscrofulous remedy; there was even a time when they were thought a true specific against scrofula.

Jurine, of Geneva, seems to have been one of the first to use the ptisan of walnut-leaves for lymphatic engorgements. Dr. Psorson, of Chambéry, recalling the successes of the professor, gave it to a beggar with old scrofulous ulcers, and by the influence of this remedy alone, in ptisans, lotions and cataplasms, obtained quite a rapid cure; since when he has continued to employ it with advantage.

In France, Dr. Négrier, of Angers, has tried the walnut-leaves on a very large scale, and has published several interesting memoirs upon the subject. Perhaps he was wrong in ascribing to this remedy an almost specific virtue. But, allowing for a little exaggeration, we must admit our debt to him for having pointed out the value of walnut in the various forms of scrofula.

The effects produced by the internal use of extract of walnut-leaves are at first general: the influence of the remedy upon local symptoms appears later. The action is generally slow, requiring from twenty to fifty days, according to the nature of the symptoms and the constitution of the subject before the effects become sensible.

In non-ulcerated strumous glands the action is not seen for quite a long time; while in ulcers and fistulous openings, whether kept up by bony caries or not, the action is quite prompt. But their final cure is sure to require a long time, which makes it sometimes impossible to ascertain the exact part played by the remedy, and that by time.

Finally, the author values the remedy very highly as a collyrium in scrofulous ophthalmia.

The resolvent and detergent properties of walnut-leaves are often made useful; many employ the decoction to advantage as an injection in the treatment of leucorrhœa and chronic metritis.

M. Vidal (de Cassis) has advised the injection of this decoction into the uterine cavity, to cure catarrh of the organ. But MM. Bretonneau and Hourmann have shown beyond a doubt the extreme danger of such injections, which, reaching the peritoneal cavity through the tubæ, may cause fatal peritonitis. (Hourmann: *Journal des connaissances médico-chirurgicales*, octobre, 1840). Dr. Cazin, of Boulogne, has used the decoction of the leaves, or the husk, as gargles, from the beginning of tonsillitis, and says that he has often aborted the inflammation.

In résumé, according to the numerous experiments of M. Négrier, of Angers, which have been verified by a large number of physicians, it seems incontestable that walnut-leaves, though certain claims in regard to their marvellous virtues in scrofula may not be proved, are very useful in that affection. We will add that, owing to their resolvent and detergent powers, they give good results in the treatment of old ulcers, and still better in chronic catarrhs of the different mucous membranes.

In a communication made to the Academy of Medicine some years ago, Professor Nélaton, in the name of Dr. Raphaël, of Provins, proposed the fresh leaves and root of walnut, as of remarkable virtue in malignant pustule and charbon. It appears that this topical application had succeeded brilliantly in the hands of a southern practitioner, Dr. Pomayrol; while Dr. Raphaël says that he obtained a rapid cure in four patients affected with œdema of the eyelids in charbon, or with confirmed malignant pustule. In spite of the miraculous nature of these results, which we may naturally distrust, we have not thought best to omit mention of them.

The husk owes its astringent virtues to the tannin and citric and malic



acids which it contains. These give it the same title to use as oak-bark, kino, etc.; while its bitter principle gives it some of the properties of the bitter astringents.

A pleasant liqueur is made from the husk, which is useful in sluggish digestion, when not due to chronic inflammation.

Hippocrates and Dioscorides recommended the husk as an anthelmintic, to be given as an extract, in the dose of 50 or 60 centigrammes (7—9 grains). This property is much contested. At present it is not admitted to possess, in infusion, decoction, or extract, any higher powers than belong to gentian and centaury.

Pollini's ptisan, made with the husks of walnut and various other active substances, is somewhat popular for the treatment of constitutional syphilis and inveterate darts; we do not attribute to it an anti-syphilitic power sufficient to enable it to supplant mercury and iodine, or a power of curing darts without the aid of any other tonic, but it is a useful adjuvant, especially when the severest symptoms have subsided.

#### UVA URSI, COMFREY, WHORTLEBERRY.

The uva ursi (*arbutus uva ursi*), a plant of the family of the ericaceæ, enjoyed during the last century a reputation to which Murray, the illustrious author of the "*Apparatus Medicaminum*," contributed not a little. In this work may be read the tales of its almost miraculous powers in the treatment of diseases of the kidneys and the urinary passages. It is still used as a diuretic, on a par with many other analogous remedies, but no more.

But uva ursi certainly has astringent properties, due to tannin and gallic acid, which it contains in such large quantities that in some parts of the North it is used to tan leather and make ink. In cases where an astringent effect is desired we prescribe the decoction of the leaves internally and externally. MM. de Beauvais, Coslithes and Gauchet (*Bulletin de thérapeutique*, 1861, t. II., p. 181), have lately represented it as an excellent substitute for ergot in childbed, to excite the uterine contractions and arrest hæmorrhages due to the inertia of the uterus. The dose given is from 4 to 8 grammes (1 to 2 drachms) of the powdered leaves in a quart of ptisan, or if the extract be prescribed, it is given in the dose of 0·3 to 3 grammes (4·5 to 45 gr.) per diem, in 3 or 4 doses.

M. Braconnot has remarked that the leaves of uva ursi are often replaced by those of *vaccinium vitis idæa*, which is very abundant in the Vosges. They are distinguished by their brownish green color; they are less entire, that is, are slightly dentate, their edges always fold downward, their transverse nervures are very apparent, their lower surface is spotted with very remarkable points.

Uva ursi is often mixed with leaves of the box (*buxus sempervirens*, L., of the euphorbiaceæ); they are recognized by their oblong-oval form, their crenation at the top, their glossy surface, their transverse and longitudinal nervures.

The whortleberry (*vaccinium myrtillus*, L.), of the family of the ericaceæ, a shrub of 20 to 24 inches in height, grows in France, Germany, and England; with green and angular branches, leaves ovate, dentate, very glabrous, resembling those of the myrtle; calyx adherent to the ovary, limbus free, with five teeth slightly marked or absent; corolla urceolate, ten included stamens; anthers bifid above and below, having at their backs two erect aristæ; the fruit is a globular berry crowned with the limbus of the calyx, with five polyspermatous compartments; the berries, of a blackish blue, white in two varieties, are refreshing to the taste. They are used to make a syrup; also in dyeing, and to color wines. They were formerly praised in diarrhœa, dysentery, hæmoptysis, catarrhal affections, and scorbutus. M. Reiss now uses them in the form of rob, tincture, or syrup, for diarrhœa, in which he has found them of use; for these berries the fruits of *vaccinium oxycoccus* might be substituted.

Comfrey (*consolida major*, *symphytum officinale*), of the family of the Boraginaceæ, does not really differ from borage, whose emollient properties it shares, except in containing a very slight proportion of tannin; it is used in decoction, as a ptisan, and in syrup for chronic diarrhœa and hæmorrhage; but it would be very imprudent to expect much from it.

It is hard to understand how this plant obtained such a reputation that Paracelsus stated that it could cure fractures without apparatus (Sprengel: "Histoire de la médecine," t. III., p. 389).

#### CATECHU.

This is a remedy of great value, which stands by the side of rhatany and tannin, almost all of whose properties it shares. Thus it may be substituted for them with advantage; but we do not think it has special properties.

We have, however, used it in large doses in the treatment of tuberculous pulmonary phthisis, not in the hope of curing a disease which is so often beyond the resources of art, but of modifying symptoms which are of themselves grave, the sweats, cough, expectoration, diarrhœa.

We have found curious results, when phthisical patients have taken it in the dose of from 1 to 6 grammes (15 to 90 grains) per diem; the cough, fever and expectoration diminished notably; the diarrhœa yielded less generally, and the excessive sweating was but little modified.

Catechu is given in exactly the same circumstances as rhatany and tannin, in the same doses as the former, and eight or ten times the dose of the latter.

#### KINO, DRAGON'S BLOOD.

This drug, very variable in origin, and consequently in composition, contains, among other principles, a great deal of tannin, with no gallic acid. Its properties are all due to the tannin.



Fothergill, who introduced it into the *materia medica* in the middle of the last century, advised it in chronic dysentery and diarrhœa, in immoderate menstrual discharge, involuntary seminal losses, diabetes, and, in general, in chronic fluxes. In a word, it is used where tan, tannin, rhatany, etc., are indicated; but it is much less active than the two latter substances.

Dragon's blood must be placed by the side of kino. It contains much less of the astringent principles than gum kino, but has the same application. They are rarely used externally.

### RHATANY.

*Therapeutical action.*—The extract of rhatany has been much used for severe hæmorrhages, and with reason; for it is one of the most powerful hæmostatics that we possess. We do not mean by this to say that it should be preferred to other non-astringent hæmostatics. In the general chapter on astringent medicine we shall point out the serious inconveniences of astringents, and will show that they ought not, in general, to be used except in moderation, and when other remedies fail. They act rapidly, no doubt, owing to the rapid modification they produce in the crasis of the blood; but this rapidity and this modification are not always to be desired.

Rhatany is used under the same circumstances as tannin; in chronic diarrhœa, chronic catarrh of the lungs, uterus, vagina, urethra, etc.; topically, for atonic ulcers; upon relaxed parts such as the inguinal ring in hernia; in *nævi materni*; in chronic œdema.

*Fissures of the anus.*—In this complaint rhatany has rendered the most signal services.

Boyer, the first who described fissure of the anus well, attributed it chiefly to a spasmodic contraction of the sphincter, with more or less deep and extended crevasses. The latter being only a complication, an accessory to the disease, it was only necessary to relax the sphincter by cutting its circular fibres, in order to cause immediate cessation of the spasmodic constriction and produce cure.

A small number of surgeons share at present the view of Boyer regarding the slight importance of the fissure and the preponderance of the constriction. Thus two opposed parties have been formed, the one attending only to the stricture, and neglecting the fissure, while the other regarded the stricture as caused by the fissure, and likely to disappear as soon as the fissure was cured. The former cut the fibres of the anus itself outside of the fissure, or employed relaxing ointments, containing as their chief ingredient the poisonous solanacæ; the latter attacked the fissure, incising it so as to convert it into a simple wound (which is not easy to comprehend), and applying to it caustics, cathartics, various pomades, analogous to those employed in the treatment of obstinate sores upon other points. Incision, however, has prevailed, upon whatever point and with whatever intention it has been practised.

Certainly, when we see physicians occupied, some almost exclusively, and others largely, with the fact of the spasmodic stricture, we are not tempted to inject into the rectum medicine which is likely to exaggerate this constriction, such as rhatany. This, nevertheless, is what M. Bretonneau has done, and upon the following grounds:

While constipation and the forcible pressure of the excrement against the sphincter, distending and often rupturing it, were evidently the cause of fissure in a great many cases, constipation, on the other hand, continued to be the greatest obstacle to a cure.

Constipation is often accompanied by a very remarkable change in the lower part of the rectum: immediately above the sphincter, the rectum forms an amphoric dilatation, contracting again at the level of the sacro-vertebral angle. In this sac the fæces accumulate and form an enormous bolus, so that when the patient goes to stool, the act of defecation is almost like parturition.

Bretonneau thought that to overcome this constipation, whether accompanied by fissure or not, it was proper to try to give to the lower part of the rectum the tone which was wanting, and that rhatany was suitable for this purpose. He gave, in simple constipation accompanied by dilatation of the rectum, injections of extract of rhatany dissolved in water with the addition of alcoholic tincture of rhatany.

A lady treated by him had, with this form of constipation, a fissure of the anus which gave her horrible pain and greatly impaired her health. He gave her every day a pint of rhatany injection, and both constipation and fissure were soon cured. In other cases, where constipation co-existed with spasmodic contraction of the anus and fissure, the same treatment effected complete cures. After this, he determined to disregard the fact of constipation (for it is sometimes absent), and the same success crowned his attempts.

His first step was taken in obedience to a legitimate induction; these facts, which came of themselves, aroused his attention; he had only to verify them, and a reasoned course of experiments led him to a treatment which in a general way was not, perhaps, rational, but which is successful; and that is the chief thing.

This treatment would be truly reasonable if constipation were always a cause or a complication of the fissure; but we quite often see patients who have fissures, troubled with diarrhœa, or soft stools, or habitually using injections morning and evening so as to prevent all pressure on the sphincter; and yet the fissure persists.

Since we published the results of our own experiments with rhatany in fissure, many physicians, in France and abroad, have tried it; in Paris, the surgeons who have been most successful with it are Lisfranc and Marjolin, which may be ascribed both to the good judgment of these skilful practitioners, to their ready acceptance of any therapeutic means which could save a bloody operation, and also to their fortunate modifica-



tions of the methods of application, according to the case, the obstinacy of the affection, or the susceptibility of the patient.

Their course was very different from that of other surgeons, who, perhaps too ready to use the knife, do not learn to handle remedies which act less rapidly than the bistoury, judge too severely the remedies which they do not wish to learn, or have tried without perseverance, and even dare to regard as imaginary certain facts which they might easily ascertain if their will to learn had been a right will.

It remains to inquire how, and by what mechanism, rhatany cures fissure of the anus.

The answer comes—"It cures, and what matter how?" We confess that such an answer is often authorized in therapeutics; but the curious mind wishes to know why, and seeks an explanation which can satisfy it.

Do the abundant tannin and gallic acid, so potent as astringents, drive off the blood which accumulates about the irritated and ulcerated part, and does the cicatrix form rapidly after the inflammatory flexion has been dissipated?

Or does the excess of tonicity imparted by the remedy to the muscles of the sphincter, the mucous membrane and the subjacent cellular network, enable the tissues to resist more vigorously the distention caused by the bolus of excrement, and does the wound which is kept from further daily rupture tend spontaneously to cicatrize? We ask these questions without professing to solve them.

Must we say, now, that rhatany cures fissure by some special virtue, as cinchona cures fever, as mercury and iodine cure syphilis? We shall not say so; it is probable that any vegetable substance which closely resembles rhatany in chemical composition will give like results. And in proof of this, MM. Payen and Manec have successfully treated some cases of fissure of the anus by the topical application of monesia, a substance which, among other principles, contains a large amount of tannin; and further, tannin in substance has given the most happy results.

How should rhatany be used? The most simple method, as it seems to us, is the following: the patient takes every morning an injection of bran-water or marshmallow-water to empty the intestine, half an hour after the discharge he takes an injection of 150 grammes of water (5 oz.) with from 4 to 10 grammes of extract of rhatany (1 to 2½ drachms), to which are added 4 grammes of tincture of rhatany. The injection is held only an instant, and is repeated at night.

In many cases the malady is obstinate, and no resource seems to be left but operation. But, with certain modifications in the method, and some accessory means, an unexpected cure is sometimes obtained.

Experience shows, first, that rhatany acts in an entirely local manner upon the fissure. We have cured, by simple lotions containing the extract, some very painful fissures, which became external when the patient strained as at stool.

If the fissure is deeper and obstinate, rectal injections are made with



an astringent solution by a syringe that gives a continued stream, while the patient resists the injection which he throws back into the basin, and which may be used over and over again for three or four minutes at a time, or longer.

Constipation very often forms an invincible obstacle. A large and hard ball of fæces every day tears the fissure and destroys the commencement of a cicatrix formed by rhatany. The patient must then take a slight laxative every day during the treatment and even for some time afterwards. The laxative which we prefer for this purpose is the powdered belladonna root, taken in the evening in a dose of 1—5 centigrammes (0·15—0·75 gr.). In our article on belladonna this treatment in constipation is especially insisted upon.

Before concluding, we ought to state that the pains are often singularly increased during the first few days of treatment, which discourages both patient and physician. The cause is easily seen; for, whereas the patient used to go to stool but once or twice a week, to save his sufferings, he now goes several times a day, which gives rise to pain which may sometimes last several days with scarcely an intermission. These cases are happily rare; when they occur, but one injection of rhatany per diem should be given, instead of two; and purgatives must not be given—at least, not until the susceptibility of the intestine is diminished.

When the pain is quite abated, only the rhatany injection is given; and at the close, when we may be certain that the cure is complete, we order one to be taken every two days for one, two, or three months.

We have tried, but without benefit, in treating fissure, suppositories composed of cacao butter 5 grammes (75 grains), and rhatany 1—2 grammes (15—30 gr.).

Wicking covered with ointment containing one part of extract of rhatany to 6 or 8 of lard, white of egg or cerate, seems to us advisable in some rare cases.

Every one will, however, modify it to please his taste and to suit circumstances.

We have seen a certain number of women affected with old and deep fissures, who refused to undergo the bloody operation, but recovered against hope after using rhatany for nearly a year.

*Fissure of the nipple.*—It was natural to apply to this complaint the treatment which was so successful in anal fissure; and M. Blache and we have done this with success. After giving suck, the tip of the breast is washed each time with a very strong mixture of rhatany, say 5 grammes of extract (75 gr.) and 10 grammes of tincture (3 iiss.) to 100 grammes of water (3 xxv.); a little of a sort of soft paste composed of white of egg and extract of rhatany is also left in the bottom of the fissure. The breast is washed when the child is to suck again. Washes containing rhatany are also very useful in the treatment of simple excoriations of the nipple.

*Stomatitis.*—In mercurial stomatitis, in certain ulcerous inflammations



of the gums, great relief is obtained by holding frequently in the mouth a wash composed of 10 grammes (3 iiss.) of the extract, 30 grammes, (3 viiss.) of the tincture, and 200 grammes (3 l.) of water.

In general, rhatany has valuable properties in relieving the pain of ulcerative disease of the mucous membranes; and as to the skin, it relieves the pain with wonderful rapidity when applied to burns, to ulcers, and more especially to blisters, when painfully inflamed and covered with a pultaceous product.

*Tenesmus*.—We have found happy results in treating hæmorrhoidal and dysenteric tenesmus; in this case the patient, directly after each evacuation, must rise from the seat, resisting the effort to expel, and wash or make a small injection at once with a decoction of 8 grammes of the root in 2 litres of water (3 i. to the pint).

Extract of rhatany is given internally, in the dose of 50 centigrammes to 4 grammes per day (7·5—60 grains), and even more. The quantity of the root to be used for a decoction is from 8 to 30 grammes, (3 ij.—3 i).

For external use, the doses are nearly unlimited.

The syrup is used to sweeten ptisans, in proportions as desired.

#### PAULLINIA, OR GUARANA.

Paullinia is prescribed in powder, extract, or syrup, prepared like that of rhatany.

In Brazil and the neighboring countries, according to M. Gavarelle, paullinia is often used by the natives in the form of a powder mixed with cacao, and made into a ptisan. It is remarkably successful in the diarrhœas and dysenteries so frequent and severe in those countries, and during convalescence it is used to strengthen the stomach, to give appetite, and aid digestion. The bitterness of the ptisan is rather agreeable to most tastes; it may be easily corrected with sugar or any sort of syrup.

M. Gavarelle has imported it from Brazil, and finds that in character it resembles rhatany, but that its bitterness gives it some advantage over the latter, in cases of dyspepsia and debility of the digestive organs.

He has also given it with profit in the various fluxes, where the astringents are so successful, as diarrhœas, blennorrhagia, hæmorrhage, leucorrhœa, etc.

We have of late often given the powder of paullinia in diarrhœa, and even in acute or subacute dysentery, and have been able to prove its efficacy in these cases. We give 1 or 2 grammes (gr. 15—30) per diem, in divided doses.

Paullinia has lately enjoyed a certain popularity in Paris, in the treatment of migraine. The directions which accompany the drug are as follows: if the attacks come several times in a month, a pill of 10 centigrammes (1·5 gr.) of the extract must be taken every morning, half

an hour before the first meal, to keep off the attacks, to lessen their number, and with the hope of a complete cure. If one is warned of the beginning of an attack, 50 centigrammes (7·5 gr.) are to be swallowed at once, of powdered paullinia mixed with sweetened water; if not, it is to be taken during the attack. If there is no improvement in a quarter of an hour, the same dose is to be repeated. The most violent migraine sometimes disappears in five or ten minutes, and quite often does not return for a long time.

The powder alone, taken as above directed, will suffice when the attacks are infrequent (once a month, for example), and are not complicated with another affection which renders the pills absolutely necessary.

We have seen paullinia succeed in migraine, but we must add that its efficacy, very manifest at first, diminishes by degrees, and most patients grow tired of it, because their attacks, while less painful, usually become longer and more annoying.

The preparations are the same as those of monesia and rhatany, and are given in the same manner and dose.

As paullinia contains caféine, its action is perhaps due entirely to this substance, which may well be substituted for it.

#### CREASOTE.

This is a new remedy, discovered by Reichenbach, a chemist of Blausko, in Moravia; he had been long engaged in experiments on tar, when, perceiving that the epidermis of his hands dried and flaked off, he found that this was caused by a special substance which he named creasote.

As soon as this remedy was introduced, it excited a great emulation among therapeutists, each seeking to find new virtues in it. Cancer, darts, hæmorrhages, caries of the bone, scrofula, phthisis, were cured by creasote, and it was with this escort that it was introduced to France, about 1859. There was an unfortunate infatuation for some months, during which the Institute and the Academy of Medicine were assailed by memoirs. The principal ones addressed to the Academy of Medicine were those of Caster, Yvan, and d'Huc, which were made the subject of a very impartial report by Martin Solon ("Mémoires de l'Académie royale de médecine," t. V., p. 120), who made numerous trials at his own hospital. Our statements of the very limited therapeutic virtues of creasote are based chiefly on this report.

*Diseases of the skin.—Burns.*—Burns of the first, second, and third degree were treated by water with  $\frac{1}{80}$  part of creasote; the commission obtained no remarkable result. The same lotions completely failed in pemphigus and lepra leontina. Creasoted pomade containing 6—20 drops in 30 grammes ( $\frac{7}{8}$  i.) of lard, employed in various kinds of dartre, was of some value in light furfuraceous varieties, but seemed inefficacious in the severer forms.



*Ulcers.*—In the treatment of atonic and foul ulcers, with callous and, as it were, bacony edges, benefit has been obtained, a part of which was due to care in dressing, which the patients had not previously taken; nor did creasote possess any advantage over strips of diachylon, leaves of lead, and other very simple, very easy and well-known applications, which do not have a vile odor. So objectionable is the latter, that the patient has to be kept at home—and even then he infects the entire house. Creasote water is of no better service in diseases arising from a prolonged lying in bed.

*Gangrene of the mouth.*—Dr. Hasbach claims to have used creasote with success in this disease, which is observed in poor children living in moist, dirty places; it is spread on the affected places with a brush; a line of demarcation soon appears between the sound and the diseased tissue, and the gangrened portions soon separate (*Union médicale*, 1853).

*Phlegmasiæ of the mucous membranes.*—Injections of creasote-water have succeeded in chronic otorrhœa, leucorrhœa, and blennorrhagia. Dr. Arendt lauds it highly in most chronic catarrhs, and especially in lientery and chronic diarrhœa; in this case he orders injections in the dose of 25 drops to 4 kilogrammes ( $8\frac{1}{2}$  lbs.) of water. The same injections have appeared to him to be useful in catarrh of the bladder.

*Vomiting.*—M. Rayer recommends creasote as useful for stopping the obstinate vomiting of Bright's disease.

*Hæmorrhage.*—The astringent action of creasote water has been made useful in nose-bleed. Pure creasote has been advised in large arterial hæmorrhage, but Mignet ("Recherches chimiques sur la créosote," 1834) has shown that even that from small arteries is not arrested by creasote.

*Erectile tumors.*—Dr. Thortsen, of Havelberg, has spoken highly of its value in the treatment of nævi materni. He dilutes the creasote more or less with water, according to circumstances, and applies it on compresses, renewed twice or three times in the twenty-four hours. Under the influence of this treatment the nævus at first excoriates, then ulcerates, and at last wholly disappears, leaving a smooth and good-looking cicatrix.

*Caries of the teeth.*—Many experiments have been made upon this treatment of caries (*Bulletin de therap.*, 1835, t. VIII.). Evidently, this substance, like those which are a little cathartic, has a general calming effect on toothache, and retards caries, just as do nitrate of silver, sulphate of copper, etc.; but it has no special properties, as may easily be proved, and to-day creasote is used by few dentists.

*Phthisis.*—There is nothing, from pulmonary phthisis down, which has not been professedly cured by fumigations of creasote-water. It is needless to say that catarrhs are sometimes modified by this method, but that phthisis has followed its fatal course.

Finally, creasote and creasote-water have been used with great success to preserve anatomical specimens; and it must be considered as one of the most sensitive tests for albumin in the urine.



*Parasitic diseases.*—The recent experiments on fermentation by MM. Pasteur, Béchamp, Pouchet, etc., having proved that the mucedines are the chief agent in fermentations and putrefactions, the anti-ferments have been applied in parasitic diseases. This idea, which has given rise to a whole series of new experiments, will be studied under the sulphites and the hyposulphites. M. Masse has used creasote upon this principle in a case of parasitic pustular sycosis. A mixture of alcohol and water in equal parts, containing 1, and then 2 per cent. of creasote, has caused the pustular eruption and the parasites to disappear in two weeks.

### LEAD.

*Phthisis.*—A few years ago Fouquier, repeating the experiments of Ettmüller, Pringle, Amelung and others, recommended the neutral acetate of lead internally for the sweats and the colliquative diarrhœa of phthisis. He succeeded in checking the diarrhœa, but, in spite of what he has said of the value of the remedy in preventing sweats, we have scarcely had a single success in the many attempts we have made. The dose, in this case, is from 5 to 60 centigrammes (0·75 to 9 grains) in the 24 hours. As to the curative action of acetate of lead in pulmonary consumption, it is far from being perfectly demonstrated, whatever may be said by the numerous authors cited in Gmelin's "Apparatus medicaminum." It appears, however, from these authorities, that we cannot wholly deny its possible value in chronic catarrhs and bronchorrhœa, and even to a certain extent in consumption.

Certain more recent experiments deserve a place here. M. Beau, who was very probably ignorant of the labors of his predecessors, believing that he had observed that pulmonary phthisis occurred very rarely in lead-workers, thought that the tuberculous diathesis might be combated by the use of lead. For this purpose he tried to produce a kind of saturnine intoxication, taking care to restrict the symptoms within limits of easy control. He gave pills containing 10 centigrammes (gr. 1·5) of ceruse, and by a rapid progressive increase made the patient take six or eight a day. He stopped the pills or lessened the dose as soon as arthralgia appeared, or the lead-line on the gums, or analgesia, or the icteroid complexion, which mark the first stage of lead-poisoning.

M. Beau cites a number of cases in which under the influence of this treatment he saw certain symptoms of phthisis, especially cough and expectoration, very favorably modified, and even in some instances the progress of the disease arrested; but he brings no cases of complete or final cure. He assists the treatment by a tonic and powerfully reparative diet.

In imitation of M. Beau, Dr. Funel has employed the acetate (in place of the carbonate) of lead, and reports several apparent successes. He explains the method of action by supposing that the salt of lead is absorbed



and carried to the mucous membrane, where it acts like the resins, the balsams, sulphur, iodine, etc., diminishing the secretion from the membrane, whence there is maintained a state of dryness in the tubercles or the granulations which is unfavorable to the work of softening and subsequent breaking-down of the morbid products. Thus, in the author's opinion, lead exercises no direct and specific influence on the process of tuberculization itself, either in workmen or in the patients treated; there is no real immunity, but rather an opposition (through a purely local process) to the evolution of the tuberculous products, so as to arrest for a variable period the progress of the disease and sometimes to bring about a true cure.

Our intention is neither to discuss this interpretation, nor to contest the results which are produced. But while admitting the real advantages which it possesses, we think that they are outweighed by the serious objections attached to lead-intoxication, which are of such a nature that in a certain number of the cases the experiment had to be stopped very soon. We therefore think that there is scarcely a chance that this treatment will be accepted in pulmonary phthisis, either as a preventive or as a cure. Yet it is possible that, if managed with prudence and restricted to certain cases with exhausting bronchorrhœa, the salts of lead may be of good service; and this is our reason for here making mention of them.

*Nervous affections.*—This remedy has been praised in epilepsy, nymphomania, etc., but the facts are so few, and most of the observations so incomplete, that no greater value can be assigned to it than to so many other drugs which have similar reputations. M. Levrat-Perroton reports fourteen examples of the success of neutral acetate of lead in pills of 25 milligrammes (0·4 gr.) and of the subacetate (12 drops in a potion), associated with various antispasmodics, in neuroses of the heart and hysteria; but all these facts need criticism, and a strict diagnosis. Its utility in superficial neuralgias is a better ascertained fact.

We must not omit to mention the internal and external use of acetate of lead in the treatment of aneurism of the heart and of the large arteries. At Paris, Koreff and Dupuytren popularized the method; they gave enormous doses of the neutral acetate internally, at first 5 centigrammes (gr. 0·75), in the morning, and rising by degrees to 1, 2, or 4 grammes (3 i.) per diem, while the region of the heart or the aneurism was kept constantly covered with compresses wet with Goulard's lotion. They assisted the treatment by bloodletting, diet, and rest. This method was pointed out long before them; it has certainly had success, and deserves to be employed more than it is. If we recall the physiological action of lead, which certainly makes the circulation slower and the pulse smaller, while it perhaps diminishes the calibre of the vessels, we shall see that it ought to be of use in the diseases of the circulatory centre and the arteries.

We must add that the method has lately been adopted by Brachet, of Lyons, who associates digitalis with the acetate of lead, in order to add to



the chances of success in hypertrophy of the heart. His formula is the following: Acetate of lead, 2 grammes (30 grs.); extract of digitalis, 1 gramme (15 grs.); make 20 pills. He gave at first two pills a day, increasing by one pill every five days until the amount taken was 2 pills morning and evening. In confirmed aneurisms or entirely organic hypertrophies, he usually obtained only a temporary amendment; while, in the case of recent or not advanced hypertrophy, the effects seemed to him unquestionable.

These facts, presented by M. Brachet to the Academy, have met with contradiction from several sources. We will quote among others M. Robert, who, having seen acetate of lead generally fail in true hypertrophy, was led to consider the facts reported by M. Brachet as cases of simple neurosis of the heart, and, in consequence, to attribute the good effects of the treatment to its sedative action on this organ. However, we must add that quite lately, Dr. Valentin, of Vitry-le-François, has repeated the experiments of M. Brachet, with the same formula, and has obtained good results in certain affections which present the signs of an early period of cardiac hypertrophy. According to this author, acetate of lead, taken internally, acts on the circulatory centre as it does on the arterial tubes in peripheral aneurisms which are accessible to local applications, that is, by its astringency, which assists the contraction and the crispation of the cardiac capillaries, and thus favors the absorption of hypertrophic molecules. Although the great part of the facts reported by M. Brachet or M. Valentin in favor of the treatment may be questioned, and the results are far from decisive, we still think them quite sufficient to invite new experiments, and to authorize hopes of success, as far, at least, as a naturally grave and obstinate affection like hypertrophy of the heart can admit of it.

*Sub-acetate of lead.*—This salt, known by the name of extract of Saturn, liquid acetate of lead, vinegar of Saturn, eau de Saturne, eau de Goulard, is decomposed by undistilled water into acetate of potassium, calcium, or sodium, and sulphate, chloride, carbonate, and phosphate of lead, which are precipitated in the liquor and make it milky, in which state it is known by the names of eau végéto-minérale, eau de Goulard.

The white water, or eau de Saturne, differs from eau de Goulard in not containing alcohol; yet they are very often confounded.

It is under these forms that the subacetate of lead is ordinarily employed; for it is seldom used pure. This is one of the best-known astringents. Placed in contact with the skin or an ulcer, eau de Goulard expels the blood, shrinks it, hardens it, shrivels it—in a word, drives the liquids from the tissues. This powerful astringent action is not accompanied by pain; and pain, if there be any present, is usually quieted.

*Diseases of the skin.*—In burns of the first degree, and when suppuration has occurred, Goulard's water is applied to the affected parts by compresses kept constantly wet. The same method is used in darts, of the acute character only, as eczema simplex and certain forms of herpes; in chronic pruriginous cutaneous affections, such as eczema chronicum; in



ulcers of the legs, especially if they tend to bleed, or if the edges become œdematous and torn.

The sweat of the feet is sometimes so acrid as to attack the skin between the toes; this causes a foul-smelling exudation, and what is more important, an ulcerous surface, which by its extreme sensibility impedes walking and prevents laborers from working. To cure this, introduce between the toes a few drops of the following compound:

Red oxide of lead ..... 1 gramme (15 grains).  
Liquid subacetate of lead..... 29 grammes (435 gr.).

This application, made once a week, will cure the affection and prevent its relapse.

The author, M. A. Gaffard, of Aurillac, says that this liquid only moderates the perspiration without entirely suppressing it; it makes it inodorous, and the skin regains its former thickness without losing its suppleness. We accept the method, but it requires prudence and watchfulness in use, for the sudden suppression of a local transpiration, if old, and of the nature of an emunctory, may have grave consequences for the general health.

*Diseases of the mucous membranes.*—In collyria, the eau de Goulard is used for catarrhal serofulous ophthalmia; in injections in the nasal fossæ, for chronic coryza, ozæna, in the auditory meatus, for otorrhœa, in the vagina or urethra, for leucorrhœa and blennorrhagia, in the rectum for proctorrhœa, purulent hæmorrhoidal flux, the chronic diarrhœa which follows dysenteries, and is due to ulceration of the lower parts of the large intestine; in gargles, in catarrhal angina, œdema of the uvula, aphthous stomatitis.

An application of this remedy was made some years ago by Dr. Barthez, then chief physician of the military hospital of Saint Denis. There were cases not only of chronic dysentery, but of the acute. The following account is borrowed from the *Gazette des hôpitaux* (décembre, 1845).

“Since August, M. Barthez has had the care of a large number of cases of dysentery, several of which died in spite of the usual treatment. Seeing the want of success, he resorted to the subacetate of lead. Proceeding with the caution which such a drug requires, he reached the dose (by injection) of 100 drops of extract of Saturn, or 5 grammes, in 500 grammes of tepid water, without causing injury. The dysentery was checked almost instantly.

“One condition is essential to success: the remedy must be applied at the beginning of the disease. Later, the rectum is so irritated that the injection cannot be retained.”

More recently M. Barthez has read a fresh paper on the same subject, to the Société des médecins des hôpitaux de Paris. He has reached the enormous dose of 30, 40, 100 grammes (3 viiss., 3 x., 3 xxv.) in injec-

tion, without producing symptoms of poisoning. These results have been confirmed by further experiments of M. Boudin's, made while chief physician to the Hôpital militaire du Roule.

The subacetate of lead has been used by him in injections in 550 or 600 cases of diarrhœa, dysentery, or epidemic cholera. The medicine, dissolved in 100 grammes (3 xxv.) of distilled water, was given in amounts of from ten to sixty grammes (3 iiss.—3 xv.) in the 24 hours, in several injections of a pint each. Not only was the remedy as thus used completely harmless, but the success was most satisfactory.

Encouraged by this immunity, M. Boudin gave the same pure, that is, without any addition, by the mouth, for the obstinate vomiting in six or eight cases of cholera, which resisted all ordinary remedies. No injury whatever followed, and in several cases relief was given. He thinks that, if used in small doses, the subacetate might not perhaps be so innocent, as it might be more easily absorbed.

There are circumstances requiring a still larger dose. M. Sommé, of Antwerp, has shown that the solution of subacetate is one of the best remedies for mercurial salivation, provided a sufficient dose of the salt be dissolved in the water. He made gargles and washes with the enormous proportion of one-eighth or one-sixth part of *extrait de Saturne*; and M. Ricord has lately shown that the blennorrhagiæ and blennorrhagic ulcerations of the neck of the uterus required, in order to recover rapidly and thoroughly, the introduction of a tampon into the vagina, in contact with the *os tinæ*, soaked in a solution resembling that which M. Sommé used in mercurial salivation.

Gargles of acetate of lead have one objection which usually disgusts the patient; the teeth become of a horrible black, which disappears after the treatment more or less completely, but gives to the mouth a repulsive look for some days.

*Hæmorrhages*.—The *eau blanche* and the extract of Saturn, in a pure state, would not probably arrest the bleeding of a large artery or vein; but they are among the most effectual means for checking the hæmorrhages from granulations and capillaries following great operations, those which occur on the surface of cancerous wounds or fungous ulcers, and exudations of blood from the mucous membranes of the nose and uterus, etc.

It remains to speak of the use of subacetate of lead in preparing moxas. The idea is Marmorat's (*Journ. des connais. méd.-chir.*, t. II., p. 172). The way to the discovery was doubtless suggested by Cadet and Rathelot, who had advised the dipping of matches for artillery and for fireworks in a solution of concentrated neutral acetate of lead (*Bull. de pharm.*, t. IV., p. 419). "The moxa, which is made of paper previously dipped in extract of Saturn and dried, is the easiest to prepare, the most convenient to use, the most regular in action, and the easiest to regulate," says Marmorat. "I call it the moxa-paper; it must have little or no size; it then takes fire at the tinder-box and burns like tinder.



It is kept in a portfolio, and a few seconds suffice to prepare a moxa, by cutting a strip of a few lines in width, which is rolled up into a cylinder of any desired size. The combustion is slow or fast, according as it is rolled tight or loose."

*Ingrowing nail.*—Many local remedies have been tried in vain for this affection, and surgeons have been forced to perform operations which almost always consist in the removal of the fungous cushion and a part or the whole of the nail. It is our duty then to make known an extremely simple process, which we have always found to succeed, consisting simply in softening between the fingers a piece of emplastrum cerussæ (carbonate of lead plaster), and introducing it beneath the fungous cushion. The flesh is dry the next day, less red, less swollen and painful; it soon atrophies, and the cure is finished in a few days.

### ALUM.

*Alum as a topical agent.*—The primary effect of alum suggested the uses to which it might be put; and as the presence of blood in the tissues was the most salient phenomenon in hæmorrhage, inflammation, and the various fluxes, alum was first used in these three classes of disease.

*Hæmorrhage.*—In young people at the period of puberty, in children during whooping-cough, or after excessive loss of blood, nose-bleed occurs, which is often followed by immediate and severe symptoms, or is the cause of obstinate maladies such as amenorrhœa, chlorosis, and various neuroses. When the flow of blood does not stop soon, it may be checked by snuffing up alum-water; if this is not sufficient, we order 25 or 30 centigrammes (gr. 3·8—4·6) of alum, finely powdered like snuff or moulding plaster, to be used several times a day; this usually makes plugging unnecessary, though it may be combined with it. This topical treatment does not prevent the internal use of cinchona, so efficacious in this form of hæmorrhage. Alum is especially valuable for arresting uterine hæmorrhage after childbirth. Rivière injected it into the uterus and vagina, dissolved in an astringent decoction ("Opera omni."). Leake dissolved it in water and used it in the same way ("Practical Observations, etc."). Smellie soaked a sponge in a strong solution, and passed it up the vagina ("Collection of Præternatural Cases"). Fabricius Hildanus sprinkled a tampon with alum and then introduced it as far as possible ("Epistolarum centuriæ"). Such means are most successful when the bleeding occurs subsequent to parturition or during lactation, at the period of weaning or toward the critical age; they will act only temporarily when the cause is the implantation of the placenta over the neck of the uterus, a polypus in the cavity of the womb, or the softening of a cancerous tumor.

Excessive hæmorrhoidal bleeding must be combated in the same way, as also the bleeding which often follows the excision of piles. We may

imitate Paulus Aegineta, and give several injections of alum; or Helvetius, who made a suppository with alum and placed it in the rectum. As regards hæmaturia, it is seldom arrested by aluminous injections, as the blood rarely comes from the surface of the vesical mucous membrane, but is most commonly due to grave renal lesions, or the passage of a calculus into the pelvis and the ureters, or the existence of a cancer of the bladder.

Alum is very successful in checking traumatic hæmorrhage, but only when small vessels are open. When, after a severe operation, the blood continues to soak the dressings, and the bleeding threatens life, it has been recommended to sprinkle alum, and to soak the charpie next to the cut with alum-water. In cachectic children, or those who have already lost blood, a leech-bite will sometimes continue to bleed; and such a slight cause may produce death, as we have unfortunately too frequent occasion to know. Before using the *serre-fines*, the suture, cauterization, or compression, which is often impracticable, the little wound and the parts around it should be covered with powdered alum; or little nails or cones, after the advice of Borelli and Diemerbroeck, may be made, and the points introduced into the bite, and kept there by the finger or a bandage. This simple method will succeed perfectly in arresting the severe hæmorrhages which so often follow the extraction of teeth.

Bleeding from the gums and pharynx is daily relieved by gargles of alum.

This topical treatment has also been advised in hæmatemesis and melæna. We can understand its value in case the blood exhales from the surface of the mucous membrane or from superficial ulceration of the stomach or intestine; but when due, as is usually the case, to a radical degeneracy of tissue, it is very certain that no use of alum can do more than retard the inevitable ending of all this class of diseases, while even the suppression of hæmorrhage will rarely be effected.

Local use of alum in inflammations.—Whenever an inflammation is restricted to a very limited part of the body, and is accompanied by small general disturbance, it may be treated by *repercussives*, that is, by remedies which drive the blood from the vessels in almost a mechanical way. Alum has always been useful in slight ophthalmia and superficial inflammation of the buccal membrane. Saint-Yves often used it for pterygium and the films which succeed variola, or remain after the cicatrization of corneal ulcers (*"Nouveau traité des maladies des yeux,"* p. 150). He mixed calcined alum with sugar and phosphate of lime, and blew the powder into the eyes. Lindt used the same remedy to cure chemosis. A simple solution of alum is equally effective. Rivière considers gargles and insufflations of alum excellent in elongation of the uvula and chronic swelling of the tonsils (*"Op. omn. med. prax.,"* liv. VI., p. 92). The same author, following Dioscorides and Paulus Aegineta, regards the treatment as very effective in ulceration and swelling of the gums.

Aretæus, Celsus, Paulus Aegineta, and all their successors, agree as



to the virtues of alum in catarrhal angina, and even non-suppurative tonsillitis. We have often been pleased with the results. Almost all the authors we have cited consider it very potent in aphthæ and aphthous angina.

Before Bretonneau wrote on the special inflammations of the mucous tissue (Paris, 1826), the nature of the malady called malignant or gangrenous angina was extremely obscure; but, since that publication, the treatment may be easily appreciated, and in some degree classified, and the experience of our predecessors may be turned to our advantage.

M. Bretonneau learnt from Aretæus that in pharyngeal diphtheria gargles and insufflations of alum arrested the development and extension of false membrane in the air-passages, and consequently prevented croup. He was more successful than he hoped with this medicine; and we, in 1828, having been placed on a special commission to several departments where an epidemic of diphtheria was raging, were convinced of the extreme efficacy of alum. When this disease is limited to the gums, and forms a disease known in the country as chancre, a wash of alum dissolved in water with vinegar and honey stops the disorder, which had in some cases resisted the most various and energetic treatment for months. When developed on the tonsils, we may limit ourselves to simple gargles, if the patient is an adult and we can depend on his exactitude; but it is more prudent to insufflate powdered alum. In the country we commonly used the spindle of a spinning-wheel, a piece of elder with the pith removed, or a piece of reed, and instructed the parents in the process, which they usually performed with great ease. We loaded one end of the tube with 4 grammes (3 i.) of powdered alum, then applied the tongue to that end, and, suddenly removing the tongue, blew briskly through the tube, thus sending a large quantity of the powder all over the back part of the mouth, the entrance of the larynx, of the œsophagus, and the nasal fossæ. The patient's cries and agitation were very useful, and in making the insufflation we chose the moment when he was making a deep inspiration. This operation is to be repeated five, six, or eight times a day, and is usually followed by efforts to vomit and abundant salivation, but after a quarter of an hour all is calm; and the severest diphtheria often yields in a few days, if it has not attacked the interior of the larynx. When the skin, the nipple, or the genital mucous membranes are attacked, as is very common in epidemics (see our "*Mémoire on cutaneous diphtheria: Archives générales de médecine*," t. XXII., p. 383), frequent washings with alum-water cure this inflammation, not without difficulty.

The same remedy is recommended for aphthæ of the mouth and larynx, muguet, and pultaceous angina and stomatitis. We have often used it with great success in scarlatinous angina, unless the latter persisted after the cutaneous exanthema had entirely disappeared.

Alum is also of use in women, and especially in very young girls, for certain acute phlegmasiæ of the vulva which sometimes are epidemic, especially among the lower classes, and are accompanied by puriform dis-



charges or membranoid exudations. We know how important it is to relieve these vulvar irritations quickly, which in little girls are so often the cause of bad habits. Alum, however, useful as it is, has not the value of nitrate of silver, which often cures at once the disease and the vice.

For vulvar vegetations, if not voluminous, alum is truly successful; it is used in powder, frequently renewed. In inflammation of the mucous membrane of the vagina, and blennorrhagia, aluminous injections form one of the best adjuvants of nitrate of silver. In fine, an alum-wash is useful for relieving the unendurable itching about the external parts of generation to which women are so subject; we prefer, however, in this case, carbonate of potassium or sodium, and corrosive sublimate.

Alum is very useful in many disorders of the female organs of generation, when it should be used in solution, or, better, in powder. For superficial ulcers and granulations of the neck of the womb, a small plug of cotton is made, inside of which is put a little powdered alum, and the plug is placed directly against the neck of the womb. A thread serves to withdraw it. Or, the powder may be blown upon the neck of the womb or the inner surface of the vagina, by means of a speculum.

If we wish to cause the remedy to reach the interior of the neck in leucorrhœa resulting from morbid secretion of the follicles, wicking covered with alum-powder may be introduced, or a crystal shaped with the knife.

The tampon containing the powder may be useful in cases of prolapse of the womb due to relaxation of the vagina, which is so common after parturition or chronic leucorrhœa.

A dentist of Paris, M. Lefoulon, who had gained a great reputation for treating painful caries of the teeth, has published his method. He makes a soft paste with alum, sulphuric ether, and a little mucilage of gum-arabic, and fills the cavity of the tooth with it. The filling is done twice a day while there is pain; then once a day for two or three weeks, until the dental nerve is no longer sensitive. Then the tooth may be filled, or the paste may be used once a week or fortnight.

Bennati (*Bulletin général de thérapeutique*, t. I., p. 265) has shown the usefulness of alum-gargles in some cases of aphonia, and in great alterations of the timbre of the voice. The patient has at the same time to practise certain vocal exercises, to which great importance is attached.

It is easy to understand how M. Payan, of Aix, cured a deafness, associated with chronic tonsillitis, by repeated applications of alum to the tonsils. We, and many others, have used nitrate of silver in the like case.

Alum is often used to check fungous granulations; it is then sufficient to use it in solution; but, if a strong astringent action is wished for, and there are somewhat hard excrescences, syphilitic or otherwise, alum in powder, especially if burnt, is preferred.

*Ingrowing nail.*—Dr. Sommé, of Antwerp, has proposed burnt alum in this affection, without any previous operation. With a flat stylet the alum is pushed between the flesh and the nail as deep as possible. A crust forms,



which is to be removed carefully, twice a day at first, afterwards once a day. If the crust were left, the purulent matter would remain enclosed by it, and no benefit would result. The remedy is very simple and easy, but requires a great deal of care and perseverance (*Ann. de la Soc. de médecine d'Anvers*).

*Chilblains*.—Added to the white of egg and camphorated brandy, alum forms a liniment which strengthens the skin against chilblains and the effects of prolonged stay in bed (Mérat et Delens: "Dict. univ. de mat. méd.," t. I., p. 209).

The topical action of this substance has been recommended in certain fluxes; thus, aluminous washes are very good in mercurial salivation, and in salivation due to inflammation of the buccal mucous membrane; but, as Gmelin ("Apparatus med.," t. I., p. 121) remarks, there is great danger in suppressing with alum the discharge of old ulcers or excessive local fetid sweats. The same remark applies to local treatment in leucorrhœa.

This danger does not exist when alum is to be used in obstinate diarrhœa, or glairy vomiting, and certain other symptoms due to a chronic phlegmasia of the mucous membrane of the digestive tract. In this case, following the advice of Paulus Aegineta, Zacutus, Bisset, some evacnants are given before alum is used. We have seen Récamier, neglecting this advice, succeed in quieting very obstinate vomiting and diarrhœa by adding to the alum a small proportion of opium; and MM. Fouquier and Barthez claim that in dothineritis (putrid fever) they successfully used alum to check the ulceration of the follicles and aid in their cicatrization, to arrest hæmorrhage and diarrhœa, and to aid digestion in convalescence. The amount given by them varies from 1 to 8 grammes (gr. 15 to 3 ij.) in twenty-four hours.

*Internal use of alum*.—Hitherto we have studied the effect of alum upon parts with which it was in direct contact; now we will state its action on the internal organs, as absorbed by the primæ viæ and brought indirectly in contact with the various tissues. As given in high doses, internally, it is most used for hæmorrhages; and most of the authors cited in this article report many instances where it was successful. Hertz advised it in weakness of the contractile power of the neck of the bladder, and the resultant incontinence; Mead and Vogel in diabetes (Mead: "Opera omnia," lib. II., p. 48; Vogel: "De cognoscendis et curandis morbis," p. 281); Thompson, in obstinate fluor albus, and what he termed relaxation of the seminal vesicles and the pollutions and spermatorrhœa which he considers may be due to it. Some have found it useful in excessive debilitating sweats.

Some practitioners, misled by their success with alum injections in the treatment of certain severe leucorrhœas which they thought symptomatic of carcinoma of the uterus, have claimed alum as a specific in cancer, and have freely used it inwardly and outwardly, with various success. Récamier, to whom science owes such useful studies of cancer,



made a numerous series of experiments with alum, with most praiseworthy perseverance, but he never cured a cancer which was diagnosed by the speculum and the touch.

We do not believe in the febrifuge virtues of alum, in spite of the imposing testimony of Boerhaave, Lindt and Monro; nor do we believe, whatever Müller and Fürstenau may say (Müller: "Diss. de Aluminis solutione vitriolata;" Fr. Fürstenau: "De Alumine dissertatio"), that this remedy ought to be ranked with cinchona in the treatment of intermittents.

Some practitioners claim that preparations of alum cure lead-colic almost as surely and quickly as the famous Charité treatment. Grashius, the author of this method, gave from  $\frac{1}{2}$  to 1 gramme (gr. 7·5—15) of alum several times a day. ("Diss. de Colica pictorum," Amstelod., 1752). Thomas Percival, ("Medical and Experimental Essays," t. II., p. 194), Quarin ("Animadversiones practicæ in diversos morbos"), gave it mixed in sugar, with spermaceti, or gum arabic, and associated it with opium. Kapeler, a physician at the hôpital Saint-Antoine, introduced the treatment here, and gives for six, eight, or ten days in succession from 1 to 12 grammes of alum in mucilaginous julep ("Arch. gén. de méd.," t. XVIII., p. 370; Mémoire de M. Mantanceix). A large number of the hospital physicians of Paris, including M. Gendrin, adopted the method of Grashius; but the latter, thinking that the action of alum was wholly due to its excess of sulphuric acid, gave for several days from 4 to 8 grammes (3 i.—3 ii.) of acid mixed in a sufficient quantity of ptisan to patients suffering from lead-colic. He has probably had successes, but we must say that our experience in repeating his experiments has not been happy, whereas the alum treatment is obviously successful, though less so than that by purgatives with opiates.

The internal dose can rarely be made greater than 8 grammes at a time (3 ii.) without causing vomiting, colic, and purging. The ordinary dose is 30 or 40 centigrammes (gr.  $4\frac{1}{2}$ —6) several times a day, but in lead-colic it is much larger; and it may be made as great as the digestive organs will tolerate, the individual susceptibility being our only guide.

### BISMUTH.

*Internal use.—Diseases of the stomach.*—It is certain that diseases of the stomach are beneficially affected by subnitrate of bismuth; but the indications given by Odier, Carminati, and Bonnat, are too vague to correspond with the present state of science.

The subnitrate is suitable for persons with habitually laborious digestion and a tendency to diarrhœa.

When there are acid eructations, or inodorous flatus, small amounts of carbonate of magnesia or bicarbonate of soda, with a few drops of laudanum, should be added to the bismuth.



When there are fetid eructations, bismuth almost always fails, unless a saline purgative has been previously given. It is therefore particularly useful in subacute and chronic gastritis, and in gastralgia complicated with an irritated condition of the gastric mucous membrane.

But when gastralgia is accompanied by habitual constipation, when there is no vomiting, or the vomiting is purely glairy, insipid, or acid; when it complicates chlorosis and alternates (as is often the case) with temporo-facial neuralgia or rheumatism; when connected with hypochondria, leucorrhœa, immoderate discharge from piles, or any flux except diarrhœa, subnitrate of bismuth is of small use.

In some of these cases, however, it may prove extremely valuable, if magnesia be added to it for the purpose of neutralizing the acidity of the primæ viæ or relieving constipation. The American powder, or Paterson's powder, which has a high repute in the United States and England, is nothing but bismuth with magnesia. It is very efficacious, and its only inconvenience consists in the fixed and invariable proportions of its components.

The vomiting of children during dentition, which sometimes precedes softening of the mucous membrane of the stomach, that which follows the indigestions caused by their extreme voracity, and that which accompanies thrush, are successfully treated by subnitrate of bismuth.

*Diseases of the intestine, diarrhœa.*—Of the diseases of the intestine proper, those which are modified by bismuth are analogous to those of the stomach which are cured by the same remedy.

When the diarrhœa succeeds a severe dothinenteritis, or when, after the fever has considerably lessened, the evacuations continue excessive, bismuth given alone in the dose of 2–8 grammes ( 3 ss.—ii.) per diem often does much good; the addition of a little aqua calcis (15 to 40 grammes— 3 iv.—x.—per day) is often very useful. Sometimes it fails completely, if each dose is not accompanied by a very minute quantity of opium.

In the diarrhœas which seem to be to the alimentary canal that which pulmonary catarrh is to the respiratory organs, and which may properly be called intestinal catarrh, subnitrate of bismuth is decidedly indicated after the first febrile heat is past. It may be taken in powder, in a wafer, or in water thickened with tragacanth: in the evening fasting, and in the intervals between meals; and, to children who dislike this way of taking it, it may be given at the moment they take their food.

In the epidemics of cholera which desolated France in 1832, 1849, and 1854, the subnitrate rendered immense service in the premonitory diarrhœa. In 1832 but few physicians chose to use it; in 1849 it had a few more supporters; and in 1854 its use was so general that the druggists dispensed enormous quantities every day, and even without prescriptions, for bismuth is one of the very few remedies which, though unquestionably efficacious, are nevertheless perfectly harmless.

Opium in very small amounts was usually associated with it. This addition is really useful at the beginning of the diarrhœa and when it is



active, but becomes injurious a little later; and a strong dose of bismuth night and morning, with a little Vichy water or lime-water at meals, leaves the stomach in its normal tone, while it acts powerfully against the exaggerated intestinal secretions.

The subnitrate is especially suitable for weakly children, who have diarrhœa on the slightest occasion and especially at the time of weaning, when the gastric viscera revolt against a new kind of food; or when the diarrhœa which usually accompanies dentition continues after the eruption of the tooth.

#### EXTERNAL USE.

*Intestinal hæmorrhage during typhoid fever.*—M. Martineau has used high doses of subnitrate for cases of intestinal hæmorrhage supervening in the second period of typhoid fever. He has given it in the dose of a gramme (gr. xv.) every hour until the bloody stools wholly cease. The two patients recovered; in the one, there was no more internal hæmorrhage after the 30th dose, and in the other, after the 40th.

*Ophthalmia.*—M. Bretonneau is, to our knowledge, the first physician who used the subnitrate in treating external maladies. He uses it chiefly in catarrhal ophthalmia in the subacute and chronic state. He blows into the eye 1 or 2 decigrammes (gr.  $1\frac{1}{2}$ —3) once or twice a day, or he reverses the patient's head, half opens the eye, and places in it a pinch of bismuth. Sometimes he powders in the same way sanious or sharply painful ulcers. In certain darts, as chronic eczema or impetigo, and in ectropium, he quiets the itching and hastens the cure, by covering the skin with a paste of magistery of bismuth and water.

*Dysentery.*—The subnitrate of bismuth is wonderfully successful in subacute dysentery, whether rheumatismal, paludal, or infectious, or even in choleric dysentery after the bloody discharge is over and the secretion has become catarrhal or purulent.

Our friend, Dr. Lasègue, by a happy inference, has applied in acute and chronic colitis the topical treatment so successfully used by M. Bretonneau. To a vehicle composed of some raw eggs, or mucilage of gum tragacanth, or of quince-pips, he adds subnitrate of bismuth in the dose of 2, 4, and up to 10 grammes (3 ss.—iiss.), injecting the mixture into the rectum, after first clearing it out with an injection of water. This is always well borne, and may be repeated two or three times in a day—for several weeks if necessary.

*Blennorrhagia.*—In imitation of M. Lasègue, Dr. Caby introduces into the urethral canal and the vagina, in case of acute or chronic blennorrhagia, a thick mixture of bismuth. It is necessary, in the case of a woman, to avoid introducing the substance into the bladder, where, if it remained, it might give rise to a calculus (*Bulletin de thérapeutique*, 1854 and 1858).

It is our custom, after modifying the acute blennorrhagia by giving



large doses of extract of cubebs from the outset, to order the following injection, while the canal is still painful:

Neutral glycerine.....	300 grammes.
Subnitrate of bismuth.....	3 “

This mixture, if shaken before using, that the powder may be uniformly suspended, leaves within the urethra a deposit which forms a dressing and remains till the next urination.

Two military surgeons, MM. Mourlon and Dauvé, have shown that, in order to obtain the expected results from subnitrate of bismuth, it must not have an acid reaction; if it should have, it must be washed with water or nitrate of ammonia (*Bulletin de thérapeutique*, 1860).

*Affections of the skin.*—Bismuth forms an ingredient in absorbent powders. In children, moisture of the skin is relieved by powder of starch, of rice, or better, lycopodium. The powder of lycopodium being yellow, ladies will not use it on the neck and face, and prefer the white powders; that of rice is almost exclusively used, and sometimes very fine starch, to each of which subnitrate of bismuth is often added. The following are the most frequently used:

*Poudre à la Violette.*

Wheat starch.....	6 kilogr.=	3 192
Powdered orris root.....	1 “ =	3 32
Powdered acacia .....	100 gram. =	3 25
Powdered cloves.....	10 “ =	3 2½

*Poudre à la Pistache.*

Pistachio starch.....	3,500 parts.
Briançon chalk, powdered .....	3,500 “
Essence of rose.....	2 “
Essence of lavender.....	1 “

*Powder for the Face.*

Starch.....	500 parts.
Subnitrate of bismuth.....	113 “

*A White Wash for the Face.*

Rose-water, or orange-flower water .....	56 centilitres.
Oxide of bismuth.....	113 grammes.

French white is composed of talc powdered and passed through a silk sieve (Piesse: *Des odeurs, des parfums et des cosmétiques*).

M. Lasègue spreads a pulp of bismuth and water over the surface of moist darts, and over that puts a starch poultice, to which a little glycerine has been added to prevent drying.

*Chronic coryza.*—*Ozæna.*—Monneret has used, in *ozæna*, powdered subnitrate of bismuth sprinkled with flour of melilot. M. H. Gintrac associates with it starch or rice fecula; often a little muriate of morphia.

*Snuff for Coryza.*

Hydrate of oxide of bismuth.....	2 grammes=	3 ss.
Powdered benzoin.....	1 “	=gr. 15
Muriate of morphia.....	0.02 “	=gr. 0.3

Two to six pinches daily (Van den Corput).

TONIC ASTRINGENT TREATMENT.

It may seem singular that the substances which compose this category are ranked among tonics, since, when locally applied, they seem to diminish the vital properties of tissues. These, however, in opposition to the other tonics, produce their therapeutic action through the intervention of very perceptible physiological phenomena; the sedative action is only transient, and soon gives place to the local tonic effects which form their proper therapeutic action.

This class of tonics always acts by the presence of an acid, a salt with excess of acid, or tannin, which is itself an acid, gallic acid combined with coloring matter and various other substances. The most important of these remedies in the mineral kingdom are diluted sulphuric acid and its compounds, as *eau de Rabel* (alcoholized sulphuric acid), alum, the sulphates of iron and zinc, the salts of lead; in the vegetable kingdom, tannin, gallic acid, nut-gall, rhatany, pomegranate, catechu, kino, the wild quince, bistort, tormentilla, red or Provence roses, etc.; and finally, cold.

Laid directly on the skin, a mucous membrane, or a sore, whether recent or old, these substances manifest true tonic effects, in the rigorous and etymological sense; that is, they produce a fibrillary constriction, a tonicity which effaces the organic interstices and the cavities of capillaries, expelling the liquids, suspending exhalation, producing cold, pallor and a well-known sensation of wrinkling and condensation.

If the application is not continuous, and a reaction is allowed to follow this primary anti-vital impression, contrary phenomena will soon appear. The tissue will become redder, warmer, more sensitive, thicker and firmer than before the tonic action; that is, through that instinct of vital reaction which, properly measured, constitutes the *vis medicatrix*, an excess of vascularity and of all the associated acts will soon replace that tonic spasm which had effaced the vascularity of the part and weakened all the organic acts which depend on it.

But if the contact with the astringent substance is continuous, or promptly renewed before the return of vascularity takes place, the living



tissues remain in that state of condensation, numbness, rigidity and pallor. They are cold, insensible, stiff, mortified without yielding to decomposition or gangrene; they are tanned like dead hides; and this avoidance of sphacelus, which may be compatible with so diminished vitality, is no doubt due to the fact that the liquids, the parts most liable to decomposition, have deserted the solids which are the less putrescible in proportion as they are more dense. It is probable that the combination of the tanning principles with the molecules of the tissues renders them less susceptible to the septic fermentation.

This is what happens when a long and unbroken course of topical astringents is kept up. But in the most common cases, astringents are applied only in order to give atonic and relaxed tissues adequate tonicity, and then no such extreme effects are sought after.—Before leaving the physiological action of astringent tonics, we should say that this action is energetic, and really tonic and durable, in proportion as it is effected by vegetable astringents, which contain the largest proportion of tannin and gallic acid; and that, when produced by the mineral acids or salts, it is less enduring and strengthening, though at first as vigorous and perceptible.

The general physiological action of the astringent tonics will appear less satisfactory and constant, and much less related to their therapeutic effects. In this respect they seem absolutely opposed to the end of tonic treatment.

In small doses, they produce in the mouth, and soon in the gullet and stomach, a sensation of contraction which is really curious, and which in the case of tannin gives for an instant the impression that the cavity of the mouth is almost obliterated. An extraordinary appetite usually succeeds this first impression. They constipate and suppress perspiration, which is probably the cause of the diuresis which often follows their use. In larger doses, the sensation of constriction of the gastric cavity changes to cardialgia, nausea, vomiting, and those pains of the stomach vulgarly known as cramps, which in a few moments extend to the intestines.

It is obvious that these substances, by producing this contraction and fibrillary spasm of the mucous surfaces, must singularly interfere with absorption by these surfaces, and must therefore be very slowly absorbed. Nevertheless, they are absorbed, and tannin is found in the urine as gallic or pyrogallie acid (Frazer). The astringent tonics, by the aid of the greater circulation, apply their action to all the tissues, to all the exhaling surfaces, the action of which they impair in the same way as when they act topically, though in a much smaller degree. This granted, we shall not be surprised to learn that dyspepsia, suspension of secretions, reduction and feebleness of the heart's action, emaciation and atrophy, are among the general effects of these medicines when given largely. From all these local and general physiological effects, however, many of which are dangerous and injurious, very valuable therapeutic results ensue, at which we will now cast a rapid glance.



Of these physiological effects, some may find their topical value in exciting vital reaction in parts which need it. Such are those which immediately produce or develop vascularity and all the consequences thereof, as a result of the immediate movement of concentration and sedation which follows the application of the astringent. But we need not speak of this therapeutic action in this place. The remedies we are now considering are never used for this purpose, for several reasons: first, because there are more certain means of reaching the object, direct and infallible means of developing a local reaction, which will be studied under the head of epispastics, irritants and rubefacients; and second, because when a vascular reaction is to be produced in a tissue by means of previous sedation, cold is commonly used. Cold is therefore an indirect topic; and if we do not speak of it here, it is because it is more specially applicable to other affections, and particularly when an absolute and very powerful sedative is wanted.

The immediate effects of continued or repeated topical applications of astringent tonics, consist in enfeeblement of the vascularity and the vital properties of the tissues, and especially in the persistence of a contracted and toned condition; these effects are often put to good use.

At the beginning of congestions, fluxions and phlegmasiæ, a great and rapid local development of the capillaries occurs. The blood enters the vessels more freely and rapidly, increasing their calibre, and penetrating many which did not previously admit it. A new and richer circulation seems to be created. It is natural to seek to counterbalance this expansive force by reducing the dilated vessels to their normal volume, by forcing those which were not intended to receive blood to return to their normal sensibility and calibre; in a word, by opposing the impending excess of vascularity, the prolonged residence of the blood in the parts, the unwonted stimulation which it maintains, and the lesions and disorganizations which result. This object may perhaps be successfully fulfilled by the application of astringent tonics which, restoring to the vessels their tone and expelling the excess of liquids, are capable of producing a favorable modification, and preventing inflammation and its consequences by dissipating the process in its first stage.

But important conditions must be fulfilled, in order that this abortive treatment may succeed without doing harm.

First, we must be on hand, so to speak, at the beginning of the phlogosis, before the alterant forces of the part (to use Grimaud's expression) are modified. Nothing must have taken place beyond the afflux of blood and the lesion of organic sensibility which so rapidly drew it into the region. The application of astringent tonics may then have the double object of restoring this sensibility to its normal type, through their direct sedative power, and of expelling the liquids attracted by this metaphorical thorn. It was long ago said, "*ubi stimulus, ibi fluxus.*" Such is usually the order of the phenomena; but the effect soon becomes the cause in turn. The astringent tonics weaken the stimulus, and conse-



quently the fluxus, which, disappearing, will cease to occasion the continuance and the return of the stimulus.

Nevertheless, in the most important cases this sharp abortive treatment is formally contra-indicated. We can see that, when the cause of the fluxion and phlegmasia has been momentary and transient, and has withdrawn after acting without having any besides ephemeral results, that the use of astringent tonics is followed by a final and harmless departure of the fluxion. But these cases are almost limited to the effects of external physical or chemical action, the fluxions and congestions termed traumatic. A part, however, of those which originate in internal pathology may be assimilated to these. When the physician is called at the very beginning of the phlegmasia, and judges that the intensity and duration of the cause are not such as to inevitably involve a regular and complete inflammation, he should promptly and methodically use the astringent tonics. They should be used methodically and continuously, because, if used for a short time only, and not until the fluxion is probably dispersed, there would be a risk of acting contrary to the intention, and adding force to the evil we desire to expel.

This success must not be expected when the fluxion or phlegmasia is the product of a general internal cause which is not eliminated from the system by the local inflammatory action which it causes. Even when this general internal cause does not survive the disappearance of the phlegmasia or fluxion, which is its anatomical expression, and when the disappearance forms a definitive crisis, or judgment, to use the Hippocratic expression, the astringent tonics are still full of danger, since they cannot succeed until the close of the phlegmasia, which, in the case supposed, must follow its course to the very end. They will therefore be excluded in all inflammatory affections produced or maintained by inward causes, whether critical and decisive of the disease, as are the febrile exanthemata, or whether they are caused by a principle which is not exhausted and may be reproduced indefinitely under the same or different forms, as in the spontaneous erysipelatous eruptions, darts, syphilis, etc.

Independently of the preceding cases, there are others, not closely analogous, but which contradict the use of astringent tonics as means to produce the disappearance of commencing inflammatory acts. These are cases where the explosion of the fluxion or phlogosis depends on a plethora as regards the quantity or the quality of the blood; in scholastic terms, "*plethora quoad molem, plethora quoad crasim.*" The first resource is then the temperant or evacuant antiphlogistic treatment, and it would involve great risk if we attended solely to the indications presented by the local affection, disregarding the general condition, which may reproduce the affection in a graver form elsewhere.

The fluxions and phlegmasiæ amenable to the abortive treatment by astringent tonics are those seated externally in the cutaneous envelope or the parts of the mucous membrane which are accessible. The secundæ



*viæ* are never to be used for introducing these substances into the general system in the abortive treatment of local inflammation.

Mineral acids, however, are sometimes used with success in chronic inflammations of the skin and the uterus, as sulphuric acid lemonade in obstinate darts, alum and tannin in chronic metritis, etc.\*

Some have attempted to act by tonic astringents upon the entire circulatory system, in the same way as upon portions. To suppress obstinate fevers, chiefly remittent and intermittent nervous fevers, they have plunged the whole body into cold baths containing in solution tannin, alum, acetate of lead, etc. This bold practice is entirely exceptional and very rare. When it is thought proper to resort to it, the principles hold good which we established in regard to commencing phlegmasiæ and fluxions.

In chronic phlegmasiæ, the indications do not exactly change. The remedy acts in essentially the same way physiologically, but, the affected parts being in a different condition and the object of acting being different, different therapeutic effects are obtained.

The habit of inflammatory hyperæmia, the changes produced in a tissue long subjected to phlegmasiæ, have remarkably weakened the capillaries. They no longer have the "*sufficiens robur*" of Stahl, to react and establish a normal circulation and nutrition. They are stricken with atony. We assume that the local or general cause of the phlegmasia is removed, and that nothing remains but the alteration of the tissue, whose organic sensibility and latent contractility are weak, act "*segniter et otiose*," as Stahl says; often the only conditions which maintain the chronic inflammations. During an acute phlegmasia there comes a moment when the capillaries of the part are distended beyond measure, as it were, by a weight of blood against which they cannot react to expel and distribute it. If resolution is prevented by the persistence of the cause, the debility of the entire system, or only that of the affected tissue, the passive relaxation and distention of the vessels persists, and becomes a habit; the local reaction is languid, but it retains the organic condition, and often the excess of secretion, which belong to inflamed parts. These atonic conditions belong chiefly to the mucous membranes. An agent which strengthens these relaxed tissues, and re-establishes the tonicity which was destroyed by the repeated extra-physiological *molimen sanguineum*, will effect a cure. But what sagacity and practical talent is required to distinguish these cases from those in which the task is not that of tanning or condensing a living tissue in order to restore it to physiological conditions! The same difficulties are here repeated which we noted above, in connection with the abortive treatment of acute commencing phlegmasiæ. There is another point, also, which needs to be carefully considered.

Supposing, as we have just done, that the entire trouble consists in simple atony of tissue, and that the inflammation consists almost wholly of certain anatomico-pathological phenomena and an increased flux, as is seen in all the chronic catarrhs (*leucorrhœa*, *bronchorrhœa*, *gonorrhœa*,



etc.); supposing, also, the absence of any principle capable of reproducing the affection, its rapid cure by astringent tonic applications, without precautions, would often be followed by bad consequences, as every day's experience attests. The membrane affected with the chronic catarrh has become an accidental emunctory, which by habit is grown to be so necessary that the suppression of its discharge must be undertaken with circumspection. It must be temporarily replaced by supplementary evacuations, by a prophylactic treatment with exutories, purgatives, vegetable depuratives, sulphurous waters, gymnastics, etc.

The same precautions are not necessary when the astringent tonics are used as resolvents, repercussives, upon infiltrated parts, engorgements, tumors generally of external causation, as strains, effusions, ecchymoses, œdemas, burns, where the object is to assist the absorption of the effused liquids and lessen the sensibility and pain, as is done by compression. They are indicated whenever we wish to cause the atrophy of a tissue; and then they should be used vigorously and continuously, as in the case of aneurism, etc. Baths with the decoction or solution of astringent tonics may be of use in those cases of scorbutic ecchymoses and hæmorrhagic purpura, when atony of the integument seems to be the chief feature of the malady. It is unnecessary to urge the cicatrizing properties of these remedies. They exist only in the case of ulcers and wounds, where cicatrization is retarded by atony of ulcerated parts, fungous granulation, and the pale color of the tissues. These applications then act like compression, which is so powerful in curing fungous, varicose and atonic ulcers.

The local use of these remedies is never so promptly and manifestly of use as in hæmorrhage from wounds or by exhalation, whenever the remedy can be applied directly to the part whence the blood issues. The remedy here fulfils a therapeutic end by means of a double physiological action; to wit, the strictum, or contraction of the extremities of the capillaries, whether cut, or allowing the blood to transpire by their exhalant orifices; and coagulation of fibrine, which, becoming instantly plastic under the action of astringents, adheres in such a way as to obliterate the bleeding orifices.

Capillary traumatic hæmorrhage yields to this treatment. Spontaneous hæmorrhage, though capillary, yields less surely, since a cause, a molimen, maintains and renews it, which is not reached by the remedy; while in the former there is nothing but a physical lesion of the small vessels, which, when once contracted and plugged, are exposed to no further cause of hæmorrhage.

There are yet other indications which call for other modes of the local action of astringent tonics. The combination of these substances with albumin, fibrin and gelatin, as we have said, doubtless produces an antiseptic action, which preserves them from putrefying, as we see in dead skin when tanned. This observation is often made of use in dressing sores which tend to mortify or which discharge septic and decomposing



matter. The barks which are rich in tannin are usefully applied in powder to foul gangrenous ulcers, to wounds complicated with hospital gangrene—in fact, to all tissues threatened with decomposition and sphacelus. We then use the tonic property of these substances, which, relieving the tissues of excessive moisture, and checking exuberant granulation, suppress the chief elements of putrid fermentation; and by their conservative, and as it were mummifying action on animal tissues, the deleterious influence of portions where putrefaction has commenced is neutralized.

If we now pass to the indications for internal use, we shall again find the three classes of physiological effects which, as we saw, form the basis of the immediate tonic action of these remedies. They act, therefore: 1, by their tonic and astringent effect upon the fibre; 2, by their coagulant properties; and 3, by their antiputrescent virtue.

In treatment, we use the former of these actions in diseases totius substantiæ, marked by those changes in the solids, for which we lately directed topical treatment, the atony being partial and accessible to direct applications.

*Scorbutus, purpura, Werlhof's disease.*—These changes are general, intimate, deep, and require modifiers which have the same characters; which can only reach them through the secundæ viæ, mixed with the fluid which penetrates and recomposes all the organic molecules. This action is much less certain and manifest than that which takes place during the direct contract between the remedy and the relaxed fibre; the reason for which is obvious.

Yet we cannot deny the existence of this action, which is of most notable benefit in scorbutus. We will not here discuss the question whether it is the solids or the liquids, the blood, which are primarily affected in this severe disease; the importance of the question disappears when we consider it simply from the point of view of the therapeutic action of astringent tonics. In the admirable pages of Broussais the subject is treated with the force, abundance and fulness of proof which distinguish this writer when he is on the right side; as regards clinical points, there is no better work to consult than that of Lind.

At all events, the crisis of the blood is attenuated in well-marked scorbutus; it loses its coagulability, its solid or organizable parts are as if dissolved in their fluid vehicle. The solids share in this tendency to a great degree; they are atonic, permeable, friable, can be penetrated and traversed by the blood at all points where its passage ought to be resisted. The astringent tonics combat this double alteration, both by their power of coagulating the blood and by their tonic effect upon the fibrillary contraction.

We need not state that these remedies, employed successively, have but a temporary and palliative effect upon the scorbutic constitution, nor that this effect must be maintained—and, as it were, fed—by agents which essentially change the character of the nutrition; to which end better material for assimilation is needed. The astringent tonics satisfy



dominant and urgent indications, while waiting for more real and radical aid, which must come slowly, and sometimes cannot be rendered at all.

These urgent indications chiefly rest upon the existence of hæmorrhage, which threatens life directly; and also from the softening and friability of the solids, which may reach such a point that the chief organs, as the heart and brain, fall into a state of flaccidity and deliquium which renders their continued functions, and even their existence, impossible. In order that such organs, including the stomach, with its mucous and muscular coats so softened and weak, may become capable of reacting upon the aliments and the analeptic tonics presented to them, which are the only curative remedies in these cases, it is necessary in these cases to bring these organs previously into a condition to bear and digest such substances. This preparatory treatment has the astringent tonics for its agents; these, giving an instant impression, conveying to the solids a momentary "*sufficiens robur*" and tonicity, place them in relation with the analeptic tonics, which, once tolerated and assimilated, fundamentally renew the blood and the solids by good nutrition.

The first principles of treatment in scorbutus inform us that the analeptic tonics, which undertake the reformation of impaired nutrition, are rarely taken from the class of drugs and foods whose general indications we are about to study, but from fresh vegetable foods, fresh young meat, certain stimulant members of the cruciferæ, and certain temperant vegetable acids, for the deprivation of these foods is often one of the chief causes of scurvy.

All excessive fluxes, all, even of the active hæmorrhages, may be beneficially combated with astringent tonics taken internally for the purpose of producing mediately in the fibre a contraction which will stiffen the tissues and render them less permeable to the liquids which flow thither, and by escaping produce the flux. It is also observed that astringent tonics, suitably diluted in water and taken internally, exercise a sedative influence upon the greater circulation, lessen the force and frequency of the heart's beats, moderate the heat, and to their depressing action upon the vascularity of the tissues add a moderating effect upon the energy of the circulation, and, indirectly, a check upon the vitality and the turgescence of the parts through which the flow or the bleeding takes place.

Asiatic cholera, among the leading symptoms of which is an excessive secretion from the gastro-intestinal mucous membrane of most fatal import, has been treated by astringent tonics for the purpose of suppressing this irrepressible discharge. This indication seemed the most pressing, natural, and radical, since the majority of practitioners regard the coolness, the gradual extinction of circulation and breathing, as the necessary result of the excessive flux. The source of the danger is thus supposed to be reached and destroyed, and all the danger conjured. But while we often succeed in arresting the alvine discharges, the progress of the fatal symptoms is little checked, or not at all. The cold stage, asphyxia, lead



the way to the tomb, and a wretched symptomatic treatment is all we have accomplished.

A very simple observation, I think, ought to limit confidence in such means; in cholera, the gravity of the symptoms and the rapidity of death are not in direct ratio to the abundance or frequency of the gastro-intestinal discharges; every one has seen dry choleræ, that is, an algid stage, asphyxia, etc., with a complete suppression of all secretion and exhalation from the intestines or otherwise. The agony is the first symptom, and the patient dies without having one stool, or only a tenth part of what is to be seen in many other cases which do not at all resemble cholera.

Is there in algid pernicious fevers, in the mortal chill of some intermittents, in the lightning-stroke of emotion which kills at once, in the incurable chill caused by the introduction of certain poisons, any evacuation which explains such effects?

It is just to add that we do not regard the astringent tonics as contraindicated for the purpose of limiting the excessive discharge of Asiatic cholera, when the symptom is prominent, may increase the general collapse, hasten the extinction of the strength, and during the period of reaction may aggravate those affections of the digestive organs and those endless inflammations which make convalescence so difficult and dangerous. But these remedies, in our view, have but a secondary place, and must not release us from the duty of obeying the more capital indications, which we are not now studying.

Taken internally, astringent tonics resist hæmorrhage, as much and perhaps more by aiding coagulation as by producing fibrillary contraction in the tissues. The more blood has been lost in a hæmorrhage, the more one must lose, because this fluid is gradually impoverished, and the system loses that power of a spontaneous arrest of hæmorrhage which is due to the plasticity and the coagulation of the blood, which, however, the *nisus hæmorrhagicus* may continue, solidly obliterates all the channels of exit. In these cases the remedy effects a great benefit; it mingles with the blood, increases its coagulability, makes its passage through the small vessels of Boerhaave slower and more difficult, and thus checks its discharge.

We have seen how the astringent tonics, applied to parts threatened with putrescence, improve the quality of suppuration and arrest gangrene. In such general diseases as are marked by a strong tendency of the fluids and solids to yield to the laws of brute chemistry, in the typhoid affections, those pestilential putrid fevers, whatever their place in nosology, but more particularly the entero-mesenteric in a putrid form, and in all morbid states bearing the stamp of putridity, the internal use of astringent tonics has always been of acknowledged value as opposed to septicism, and the general dissolution of the blood and the solids. Sulphuric acid lemonade and slightly aluminous drinks have been principally used for this purpose. The last period of typhoid diseases (using the



term in its widest and most correct sense) is the chief time for these remedies; at this time it is also desirable to raise the tone of the stomach, reanimate the digestive functions, moderate diarrhœa and the tendency to intestinal hæmorrhage, which is then too frequent. They also restrain fever; and these effects have more, perhaps, to do with recovery than the directly antiseptic action.

In speaking of the physiological action of astringent tonics used internally, we mentioned the injury to the digestive power, arrested nutrition, suspension of secretion, emaciation, and general atrophy which might result from an imprudent and protracted use of them. These observations furnish the ground of some contra-indications. But the injurious action may be made useful, if directed toward the excess of assimilative force, or more often, the want of proportion between a defective disassimilation and an excessive nutrition, which produces obesity or polysarcia; and it certainly would not be impossible to equalize these forces to some extent by the prudent and continued use of astringent tonics.

Having now examined in a general way the indications, if we attempt to draw the conclusions which they involve in regard to pathology and general therapeutics, we shall be struck with the following considerations, which the reader will easily develop without our aid.

The astringent tonics contract, condense, tan the tissues, and dissipate their moisture. Another class of remedies is exactly the opposite in its effects, namely, the emollient or atonic remedies, which relax, soften the tissues, and make moisture predominate in them. Now, suppose for an instant that our therapeutical resources were limited to these two classes, tonics proper, and atonics or emollients, what would be their poverty, and how many the indications beyond those which these two classes are fitted to fulfil! They are the two with which practical medicine could dispense the most easily; they are hardly more than adjuncts or palliatives when associated with treatment. Let it be remarked that we do not mean to speak of the remedies which produce indirectly these two opposite states, the strictum and the laxum, but of those which produce them immediately. We do not refer to bloodletting, purging, etc., which remotely produce atony, nor to iron, analeptics, gymnastics, etc., which remotely produce tonicity; for we might in this way reduce all treatment to the definitive production of these two organic conditions. We speak only of agents which cause them by a peculiar and characteristic action.

The hypothesis being thus restricted, who does not see that therapeutics would be disarmed in presence of ninety-nine of every hundred diseases, and could lend no real aid except in a few, and that, even in these, they would sometimes have to leave untouched true indications? What sterility and falsehood would invade those systems of medicine which should adopt as their physiological basis this fictitious dichotomy, which

should have formed all etiology and pathology upon the pure, unique, and essential lesions of these two states of the living solids, and should reject all remedies but those suited to contract or relax the fibre—tonics and emollients !

And yet, it is within this narrow sphere, this niggardly, inadequate therapeutics, superficially modified by the different medical epochs, that all the exclusive solidists for the last two thousand years have been revolving ! From Asclepiades to Cœlius Aurelianus, the strictum and the laxum ; later, excess or defect of irritability, tension and relaxation, spasm and atony, sthenia and asthenia, the stimulus-diathesis and contro-stimulism, irritation and abirritation, excitation and paralysis of vaso-motor nerves, have only changed their form in passing through the systems of Glisson, Baglivi, Hoffmann, Haller, Cullen, Brown, the school of Rasori, and the physiological school. It is true that immense progress has been made from Themison to Broussais and his successors, and that ideas have grown less coarse, and larger and more physiological. “Themison,” as the immortal author of the “Examen des doctrines” very well says (“Ex. des doctr.,” t. I., p. 112), “did not calculate the sum of the vital forces; he did not rise to that generalization of modern vitalism; he saw only the pores, and in general all the openings of the exterior of the body,” etc. Yes; but it is proper to add that, excepting anatomical details which at that date were impossible, Cœlius Aurelianus left almost no fundamental detail for Broussais to discover. But Broussais did not know this; and the public might have been yet more learned, without detracting from Broussais’ celebrity, and with no less glorification of his errors on the part of the medical world.

It is nevertheless certain that all these systems, in their native purity, and remaining true to their principles, are forced to reject the most precious observations of the clinic, and a great many of the best attested remedies. The exclusive solidist ought not to pay attention to the primitive morbid change of the liquids, the special course which this condition gives to disease, and the resultant modifications in therapeutics; he must reject the specific nature of disease, and with it the specific remedies; he must admit only the path of a vague and indeterminate sympathy in explaining general affections, the simultaneous or successive occurrence of morbid symptoms; he must see only quantities and never different qualities in disease; in a word, he must despise all the precious observations and precepts which have been stored up by the physicians of the Hippocratic line. Remark, therefore, that the exclusively solidist schools have been able to furnish men of great talent, illustrious writers, but not such as deserve to be called profound observers, consummate practitioners, and whose works are beyond the outrages of time and systems.

As the therapeutic agencies which act only on the living solid to increase or relax its tonicity have a very limited range, and are often dangerous, since in general (except in the simple cases which we distinguished above) they attack only the external manifestation of the disease,



and leave the cause or generative condition in all its morbid power; so are the systems of medicine which rest on exclusive solidism insufficient and dangerous, since, in a very large number of cases, they see and attack only the external acts or the symptoms which the solids alone are able to manifest, and leave the principles or causes in all their morbid intensity.

It is superfluous, we think, to give proofs of these assertions; any one may easily supply them. What we have said of the topical indications and contra-indications of the astringent tonics may lead the way to these arguments, as numerous as they are incontestable.

## CHAPTER III.

### ALTERATIVES.

#### MERCURY.

##### *Therapeutic Action.*

THE topical action of mercury, as we shall see further on, renders it one of the most potent of substitutive agents. Our attention will first be directed to mercury as a general agent, and the topical action will be described at a later point.

#### MERCURY IN SYPHILIS.

*Infecting chancre.*—A leading characteristic of this disease is its period of incubation, the duration of which averages twenty-six days. It is, therefore, not open to the ectrotic method advised by Ricord, which consists in killing immediately, by an energetic cauterization, every chancre which has not passed the fifth day after contagion. If the chancre is mixed, that is, has at first the marks of simple chancre and becomes indurated later, Ricord's practice presents no inconvenience, though the chances of arresting infection are quite small. We consider the infecting chancre as the first manifestation of general infection; it not only requires treatment like any ulcer, but imposes the duty of deciding whether mercurial treatment must be used.

We ought to remember that indurated chancre may readily get well without treatment, leaving no cicatrix. There is then no immediate need of mercury; it is required for the future. Experience, however, shows that feeble caustics containing, for instance, acid nitrate of mercury, or sublimate, may improve a chancre which, under a non-specific treatment, becomes excessively chronic or is aggravated.

Grant, as we must, that these primary symptoms recover without mercury: the question remains—Is consecutive syphilis more common when the primary symptoms have been treated with mercury than when not? Facts are invoked on both sides by the partisans of the new and the old theory; both have published statistics, which have been charged with falsehood; and in the midst of this conflict we can hardly take any other ground than that of the immense majority of physicians, who always direct mercurial treatment for patients who have had syphilitic symptoms; no matter whether these have disappeared or not, under the influence of



simple and non-specific treatment, provided the induration of the primary chancre has been well attested. This treatment, if methodically and prudently conducted, never causes inconvenience, and we do not see why a precaution should not be taken, the omission of which might be fatal.

*Syphilitic infection.*—When consecutive and constitutional syphilis appears, mercury, though not infallible, has so evident a power that an inconceivable blindness is required in order not to see it. In this case the treatment should be long continued, and the general hygienic precautions which are proper in venereal disease are absolutely indispensable here.

Two methods dispute the precedence in the treatment of syphilis by mercury. In the one, the doses are diminished, the intervals increased, and salivation is never produced; sudorifics and depuratives are used at the same time; treatment is kept up till the symptoms of syphilis are all gone, though from time to time it must be suspended to give the system rest, and to let it recover susceptibility to the action of the medicine. When all the symptoms of syphilis are past, treatment is insisted upon for a month or two longer, and then stopped.

This plan is called the method of extinction, or method of Montpellier; not that it perfectly agrees with that which Haugenot first recommended by this name, but as preserving its spirit and tendency.

The other method consists in giving mercury externally, internally, or in both ways, to produce rapid salivation; this is the method of Boerhaave, or that of saturation.

The latter is certainly the more active and efficient, but it requires numberless hygienic precautions and a severe regimen, which patients do not like. It is preferred, and always should be preferred in special hospitals, where strict watch and discipline are possible; but elsewhere the method of Montpellier has prevailed, as being easier to follow, more convenient, not exacting in its regimen, and not requiring a change in habits which might attract attention. Physicians, in spite of themselves, give up a method which they think the best, and by this disgraceful concession, assuredly cause the grave consecutive accidents which we have to lament daily.

The following is Boerhaave's method of obtaining salivation:

1468. To procure it, drench the patients for several days with large quantities of ptisan.

1469. Next give a small dose of calomel every two hours.

1470. When the breath begins to be fetid, the gums are painful, the teeth seem to grow longer, examine whether it be proper to continue, to stop, or to check the symptoms.

1471. A salivation of three or four pounds a day is enough.

1472. If less, it must be excited by mercury.

1473. If more abundant, it must be restrained by emollient clysters, purges, sudorifics.

1474. If mercury attacks the bowels, opium and sudorifics are indicated.

1475. If the throat, mouth and gums are too swollen and painful, give remedies as indicated in aphorism 1473, and softening gargles or collutories.

1476. This treatment should be kept up till the symptoms have entirely ceased, usually thirty-six days.

1477. Afterwards, for thirty-six days more, give only very moderate doses of mercury, to maintain a slight salivation.

These rules are still followed by some in very severe and obstinate cases, when the patients consent. As regards the choice of mercurial preparations, however, and the mode of administration, there is a disagreement among his followers. Some rub in mercurial ointment upon the thighs, arms, axillæ, genitals; others prefer sublimate baths after the method of Wedekind and Récamier; some fumigate with cinnabar in an apparatus which leaves the head out; others prefer internal treatment, and give, following Boerhaave's example, calomel, or blue mass; but the most renowned of the internal remedies are sublimate and the iodides, the former introduced by Van Swieten, the latter chiefly by Biett and the French physicians of our century.

Richard Wisemann was the first to use corrosive sublimate internally; he never gave it alone. David Turner, in 1717, gave it dissolved in brandy, and about the same time it was used in the Palatinate as advised by Brunner. But the praises of Van Swieten procured an extraordinary reputation for this remedy. By his orders, it was used in all the Austrian armies for the treatment of venereal disease; but Brambilla states that the surgeons, convinced of its uncertainty and its danger, secretly employed calomel while lavishing extravagant praises on the remedy prescribed by government (Sprengel: "Hist. de la méd.," t. V., p. 518). The severe and inappropriate measures taken by Van Swieten to force his confrères to use his favorite remedy made many enemies for it, who exaggerated its dangers; but, in spite of these violent quarrels (Stoerck: *Ann. méd.*, t. II., p. 215), Van Swieten's solution and pills of sublimate were soon introduced into all the military hospitals; and at this day, sublimate forms the basis of the pills and solutions given by the wretches who feed on the credulity of patients by praising their "treatment without mercury."

For some years past, protiodide of mercury has been substituted for sublimate and frictions with ointment in constitutional syphilis. The remedy is certainly powerful, but ought not, perhaps, so entirely to exclude other remedies in secondary disease.

*Syphilis analyzed.*—*Syphilidæ.*—Cutaneous syphilis affections are divided into two classes. One, resolute or benign, is usually precocious, and may disappear without treatment; the other, ulcerous or malignant, is tardy; the latter is the one usually treated with mercurials, and the less mercury has been previously taken, the more active this treat-



ment. The most active preparations are, therefore, reserved for this class.

*Syphilitic affections of the mouth and throat.*—Mercury, which so easily affects the mouth, is much less successful in syphilitic disease of this part than in the syphilidæ.

M. Créquy has invented a very efficient treatment for these troubles, consisting of pastilles, made by the following formula:

Protiodide of mercury.....	0·05=gr. 0·77
Iodate of potassium.....	0·05=gr. 0·77
Chlorate of potassium.....	0·20=gr. 3·1
Sugar.....	1· =gr. 15·
Gum tragacanth, and orange-flower water sufficient to make a mucilage.....	q. s.
Essence of citron or mint.....	one drop.
Carmines to color.....	q. s.

Make a pastille of about 30 grains; one or two to be taken daily.

This preparation has several advantages. Its nature is not suspected—it is really a secret remedy. It has also the advantage that, in moving about in the mouth, the remedy is made to touch the sores, and a part is absorbed through them. Then the addition of chlorate of potassium enables the remedy to be borne as long as necessary. Our own experience is most favorable. We have cured with this remedy syphilidæ of the mouth and throat which had resisted ordinary treatment and were desperately obstinate. We have had encouraging results in circumscribed tuberculous syphilidæ, a slow and tenacious form. We had supposed that the efficacy of these pastilles was due to the formation of a double iodide by contact with the saliva or gastric juice, but a solution made and analyzed by M. Lefort, who is a very competent authority, shows that no decomposition takes place in water.

*Syphilis of the bones, tendons and muscles.*—Here mercury is generally inefficient, while iodide of potassium has a heroic action, especially in the case of bone. It is not quite so with muscular tumors, which we have seen appearing in company with tardy syphilidæ and yet recover, as if by enchantment, under the influence of emplastrum de Vigo associated with internal mercurial treatment.

*Visceral syphilis and syphilitic affections of nerves.*—Here iodide of potassium has very little action, and mercury, especially as given by Boerhaave's method, must be preferred.

*Hereditary and congenital syphilis.*—What is to be done with a child that is born with the usual signs of hereditary syphilis? The affection is so grave and fatal, that some practitioners, as M. Roger (*Société médicale des hôpitaux*, 1865), think it useless to begin treatment. Yet if we have any reason to hope that the child can resist, we must treat, but with small doses.

A child born of parents who are clearly syphilitic, does not usually have signs of infection upon him at birth. We think it useless then to employ specific treatment, which we reserve till symptoms appear. The thing to be insisted on is, that the mother shall suckle the child herself, and not give it to a nurse, since a sore in the mouth might escape observation, and infect the nurse, when the physician would be responsible to a certain extent. If the child must be given to a nurse, the latter must be told not to give suck except by means of an artificial nipple.

When the symptoms appear, mercury must be the basis of treatment. The substitutes are impracticable for the infant. We continue to prefer the liquor of Van Swieten, in the dose of 1 or 2 grammes (gr. 15—30) a day with milk; but this sometimes causes or keeps up diarrhœa, and has to be abandoned for a short time.

Calomel, even associated with chlorate of potassium, and protiodide have few partisans. Mercurial inunction has disadvantages connected with the intestine, and others.

The first indication is to take care of the infant's skin and extinguish the symptoms as soon as possible.

Of all remedies, we do not know one comparable to the baths and solutions of sublimate. The solution of bichloride of mercury in water, by the aid of alcohol or muriate of ammonia, has the immense advantage that it can be graduated according to circumstances, from the slightly caustic solution to that which causes no perceptible sensation. For a child's bath we never use more than one gramme of sublimate. The child tolerates the bath almost as well as the adult, and it would be bad practice always to reduce the solution to the degree prescribed by all formularies. When the skin is cured, though the syphilis be not cured, the cachectic debilitated child may be unable to derive nutriment enough from the breast, when tonic, gelatinous, aromatic, salted, sulphurous baths will supply resources which internal medicine does not yield. But this class of remedies is inapplicable except when they act upon a sound skin.

Diet, in infantile syphilis, is the first of adjuvants, if not of medicines. The mother must nurse the child when possible, and take Van Swieten's liquor, which should always be prescribed ("Clinique médicale de l'Hôtel-Dieu," 2e. édit., t. III).

*Forms of syphilis.*—When a person in apparently sound health is affected, the pathological tendencies of the organism usually come to light and give to syphilis a special aspect and course. This is why scrofulous persons have ulcerative and suppurative syphilis more frequently than others, the gouty have tuberculous syphilidæ, and the darts moist and intractable syphilidæ. We must never forget to unite to the mercurial treatment a regimen suited to the patient's constitution; as, otherwise, the therapeutic effect, as distinct from the physiological and toxic, will not be developed.

Finally, extreme heat or cold of climate is bad for syphilitic patients;



and, in obstinate cases, it may be well to send them to the temperate climates bordering on the Mediterranean.

*Duration of treatment.*—In what dose should mercury be used to destroy a constitutional syphilitic disorder? A categorical reply is impossible. In Boerhaave's method, the proper dose is that which produces the effects which he requires. In the method by extinction, the proper dose will be such as causes the syphilitic symptoms to disappear. It is impossible to say anything more exact, and for the following reason.

Salivation sometimes occurs during inunction with mercurial ointments, so that it can be performed only once a week, in order to keep the salivation at that moderate degree required by Boerhaave. In this case 15 grammes (230 grs.) of the ointment will suffice for treatment. At other times, to obtain the same effect, twenty, thirty, even a hundred frictions of 8 grammes (3 ii.) will be required, making 750 grammes (188 drachms) of ointment. One is suitably affected by sublimate given in the dose of 1 or 2 milligrammes (gr. 0·015—0·03), another will bear 25 milligrammes morning and evening, and will have to continue its use two or three months.

The same is true with the method of extinction.

The physiological law is perfectly applicable here, that one is nourished by what one digests, not what one eats. In therapeutics, we may say that the patient is cured, not by what he takes, but by what is absorbed. For reasons impossible to estimate, the system may absorb only an atom of mercury when enormous doses are offered to the absorbent surfaces, while minimal doses are absorbed wholly. It is further necessary, in order that mercury shall be of use, that it should produce its alterant effects; we cannot deny that the system very often resists the toxic action of the drug, and requires proportionately large doses.

Mercury has been recommended as a preventive of syphilis. Falck ("Treatise on the Venereal Diseases," London, 1771) and W. Harrison ("Diss. de lue venerea," Edinb., 1781) said that this end might be accomplished by having the loins rubbed with mercurial ointment before coitus. L. Warren caused the glans to be rubbed with it ("Nouvelle méthode pour guérir la gonorrhée virulente," Amsterdam, 1771). Assalini caused frictions with calomel and saliva to be made in the hollow of the hand or on the penis ("Essai médical sur les vaisseaux lymphatiques, etc.," Turin, 1787). Guilbert de Préval had the genital parts washed with eau phagédénique before and after connection ("Examen de l'eau fondante" de M. Guilbert, etc., Paris, 1777). J. Hunter had urethral injections made after the act, with a weak solution of sublimate in distilled water, 5—10 centigrammes of dento-chloride of mercury to 250 grammes of water (gr. 0·8—gr. 1·5 to 5 viii.). ("Treatise on the Venereal Diseases," London, 1786.)

We are not sure that all these plans are as valuable as they claim to be; the anointing with fats before coitus may have a mechanical preservative action like that of a condom; lotions, of whatever nature they be, made after an impure connection, may prevent the virus from remaining

in contact with the genital parts; but evidently we should not be in haste to infer the preservative action of mercurials, nor should we attach much importance to that very apocryphal experiment of Harrison's (*loc cit.*), who, having mixed syphilitic pus with a mercurial, proved the innocuousness of the mixture by repeated inoculations (see Gmelin: "App. med.," t. VIII., pp. 28, 29). Do we not know that M. Ricord has destroyed the poison of chancre by mixing it with a great many chemical agents very unlike mercury?

We are absolutely ignorant of what mercury could do if given as a preventive, though we might very easily learn. There are certain industries where mercury is handled; the workmen are constantly impregnated with it; it would be curious to know whether syphilis is more or less severe among these than among others, or whether it is modified in any way.

*Peritonitis*.—Antiphlogistic treatment, usually so efficient in phlegmasiæ of the serous membranes, is usually powerless in puerperal peritonitis and acute hydrocephalus. A treatment is required which is powerful enough to quench the inflammation suddenly. Mercurials in large doses have seemed to fulfil this end, at least for peritonitis, if we are to believe the numerous testimonies of recent years. The popularity of the method is due to M. Velpeau. No doubt, calomel and mercurial friction had been used long before his time in peritonitis and a multitude of other inflammations; Vandezande used calomel and frictions, but relied chiefly on calomel and opium, and used frictions only secondarily, applying them once or twice a day to the thighs, and only when he could not give the protochloride internally. Laennec used friction, but chiefly in chronic peritonitis. Chaussieur used them in puerperal peritonitis, but weakly and unmethodically. Velpeau, on the contrary, endeavored to procure the immediate absorption of very large doses of mercury, so as to produce mercurial cachexia as quickly as possible. In this way he sought to bring the blood in a few hours into such a state that it would be unfit to nourish a severe inflammation; and this seemed the more necessary to him, as in puerperal peritonitis the inflammation makes such fearfully rapid progress. He gave the drug in all forms and in enormous doses; by friction upon the bowels and thighs at once, simultaneously with the internal use of calomel, so as to produce a profound mercurial infection instantly (*en peu d'instants*). He continued the treatment until signs of saturation of the system occurred, that is, swelling of the gums and abundant salivation. Velpeau's first observations were published in the *Revue médicale*, January, 1827; but the paper printed by him two years later, in the *Archives générales de médecine*, t. XIX., p. 535, placed the mercurial treatment at the head of those which succeeded in many epidemics. We say, in many epidemics; for in some it fails. M. Tonnelé, in a memoir printed a few years later in the *Archives*, showed that frictions, in the hands of the physicians of the Maternité, had not proved as successful as with M. Velpeau. In certain epidemics of puerperal fever, the course is so rapid that death



occurs in a few hours. Of course, under such circumstances, no treatment can be of use, not even the most active and powerful.

To apply mercurial treatment in peritonitis mildly, would be to mistake the nature of that treatment. When once the inflammatory products have been allowed to be effused into the peritoneal sac, the value of the remedy becomes extremely doubtful. It is as with bleeding; all does not depend on giving mercury and drawing blood, but on doing these to the proper extent in the right way.

The doses of mercurial ointment used by M. Velpeau to produce prompt salivation varied from 30 to 60 grammes daily (nearly  $\frac{1}{3}$  i.—ii.). We have been bolder, and have habitually prescribed it in the dose of 100, and even 150 grammes (nearly  $\frac{1}{3}$  iii.—v.) in the 24 hours, while M. Paul Dubois did not fear to use from 500 to 750 grammes (nearly  $\frac{1}{3}$  xvi.—xxiv.) daily.

We can pardon excess in the presence of such imminent danger; but it must be confessed that such active treatment has its inconveniences. As soon as salivation occurs it is certainly desirable to stop, but the mercury already covers the skin, soils the clothes and the bed, and, in spite of the minutest pains, absorption must continue for some days longer. Mercurial intoxication makes rapid progress; and it is then that severe lesions of the mouth occur, besides those severe general eczematous eruptions which are so well described by Alley, and those gangrenous inflammations of the genitals which are mentioned by Paul Dubois.

It is here that Law's method finds application. [Hourly doses of gr. 0.064 of calomel in pill; salivation produced in from 24 to 48 hours.—Transl.] In this method calomel produces salivation nearly as soon, and quite as surely as the most copious inunctions; and as soon as salivation is produced, we have the power to stop instantly the administration of what is sometimes so pernicious a poison. For more than fifteen years we have substituted Law's method for the frictions with large quantities of ointment of which we were formerly the zealous partisans; we have always obtained the effect which we had formerly secured by frictions, and this, not only without inflicting fatigue and risk upon the patient, but without inconvenience to the nurses.

*Acute hydrocephalus.*—It is very rare that recovery takes place from this affection—acute and simultaneous inflammation of the meninges and the brain—either in a child or in an adult. It is the locality, not the extent, that makes it so dangerous. As soon as our diagnosis is positively made, the nervous pulp is already on the point of disorganization; and, however active may be our treatment, it still fails, to the despair of physicians and the family. The mercurials, both internally and externally used, have been advised as in peritonitis, but with less success, for the uncertainty of the diagnosis destroys much of the practical interest of the observations, numerous as they are, published by Percival, Delpech, Major, and others. M. Liégeard (*Bull. de thérap.*, t. VII., 1834) and Beid Clanny (*Journ. des conn. méd.-chir.*, nov., 1836) have since pub-



lished new cases of the use of mercurials in acute hydrocephalus; the latter insists much on the point, that too much mercury cannot be absorbed, nor too quickly, and gives internal doses of calomel which to most physicians are frightful, but which cease to be such when we faithfully and impartially examine his reasons for giving such doses. He remarked that almost all the calomel which he gave was found in the stools of the patients, so that when 60 centigrammes (gr. 9·2) were given, not one centigramme was absorbed; he therefore thought that he might increase and repeat the doses, and gave from 4 to 8 grammes (3 i.—ii.) of calomel daily, whereby he made the system absorb speedily a dose of mercury capable of acting powerfully on the system. Since adopting this system, he has found hydrocephalus much less to be dreaded; and whereas he formerly lost almost all his cases, he now considers the disease readily conquerable.

Whatever confidence we may have in the method and the assertions of Beid Clanny, we confess that we shall hesitate to accept his results until we have seen similar success. In several cases of meningo-encephalitis we have used his method without success, though we applied it with an energy which our author must have approved of.

We have used Law's method also without success, in this terrible disease, continuing the calomel not for two, but eight days in succession. We have rarely obtained salivation; but even when the gums were severely inflamed, the disease nevertheless went straight on to its fatal termination.

The inadequacy of mercurial treatment in the encephalo-meningitis of children furnishes no argument against its general efficacy. Death is almost certain in acute hydrocephalus, whatever we may do. We have grown old in practice, we have long been at the head of a hospital for children; but we confess with pain that we can scarcely number one or two cases in which we have seen a child recover from a cerebral fever.

*Acute synovial rheumatism.*—The rapid and favorable effects of mercury in peritonitis, the most fearful of serous phlegmasiæ, suggested to us the idea of employing it in acute articular rheumatism. We have thus treated fourteen cases, in which the fever was very high and a great many joints were attacked. In six, the cure was extraordinarily rapid; but in the other eight the disease went on as if nothing had been done. The pain, however, was less severe, and we thought the cardiac complications were less frequent. Here, as in peritonitis, we caused ointment to be rubbed in upon the belly and thighs—from 20 to 60 and 120 grammes daily (3 v., xv., xxx.) until the gums swelled, which usually occurred at the end of the second day or the beginning of the third. We then ceased, and confined our care to the maintenance of a mild temperature and the administration of emollient drinks. In the hospitals this treatment is inconvenient; the ward-tenders dislike it, the sisters of charity oppose it because it soils the bed-clothes, and at the commencement of salivation, when it is indispensable to clean the skin thoroughly and give fresh linen in order to prevent further absorption, they neglect these small attentions, and the severest inflammation of the gums results. Add to this,



that the wards are not tight, that sweeping and ventilation are performed morning and evening without pity or regard, and that the unhappy patient is exposed to all the evil consequences of an energetic mercurial treatment. We therefore abandoned the treatment at our hospital, not because it did not seem preferable to others which we knew, but because we could not secure the required care and attention.

Now, however, having learned the method of Law, we no longer hesitate to push the drug till the gums begin to swell and salivation appears. The fever is sensibly diminished by that time, and we then use sulphate of quinia in the dose of 1 or 2 grammes (gr. 15—30) per diem as directed by M. Briquet, powdered digitalis in the dose of from a quarter of a gramme to a gramme, which mixed method has seemed to us the most effective in acute rheumatism.

*Chronic articular rheumatism.*—We cannot speak too highly of the happy influence of mercury in this complaint, whether it be the consequence of blennorrhagia or the remains of an acute malady caused by cold. One of our pupils, M. Bonardel, wrote his thesis upon this subject in 1834 (*Journal des connaissances médico-chirurgicales*, t. II., p. 50), since when we have had many occasions to repeat his experiments.

Subsequently to synovial rheumatism, which may not have been very marked, we sometimes see several joints in succession swell, and the symptoms increase more or less rapidly; the enlargement is like that of the first stage of white swelling, and we have seen a young man almost all of whose joints were affected. The swelling is situated, not only in the soft parts, but also, and more commonly, in the bones and fibrous tissue. It is quite remarkable that, in this case, fluctuation is rarely observed in the synovial capsules.

In this case we do not need, as in peritonitis and acute synovial rheumatism, to push the mercurial, and produce instantly the state of cachexia to which is very probably due the good effect of mercurials in these two inflammations. The chronic state requires a chronic treatment, if we may express ourselves thus; let us, therefore, employ weak and graduated doses, as in constitutional syphilis. The best method, in our experience, is that by baths of sublimate. The bath for an adult may contain from 8 to 30 grammes (3 ii.—3 i.) of sublimate in solution, and may be employed daily or on alternate days; we continue thus till the swelling and pain are entirely gone. This treatment is accompanied, as in constitutional syphilis, by concentrated sudorific drinks, some simple baths and vapor-baths, and is terminated by fumigations of cinnabar in an apparatus which does not expose the head to the fumes.

The English prescribe in this case pills of calomel and opium according to the following formula :

Calomel.....	3 parts.
Opium .....	1 „
Conserve of roses .....	q. s.

To be made into pills each containing 10 centigrammes (gr. iss.) of calomel; one or two to be taken daily.

There is a form of chronic rheumatism, or rather atonic gout, observed more especially in women, which attacks the joints successively and at last becomes a most afflicting complaint. M. Lasègue, who has published an excellent paper on this disease, which he calls nodose rheumatism, in the *Archives de médecine*, finds that mercurials were almost always useless, and that tincture of iodine continued for several months in the enormous dose of 2—5 grammes (gr. 30—75) per day, checked, and sometimes cured this terrible disease. We have tried this method and found it beneficial.

The sublimate baths have seemed to us much less useful in interarticular chronic rheumatism than in that which is seated in the joints. Nevertheless, in our practice, we have two or three times obtained so rapid improvement that we were tempted to think that syphilis had something to do with the pains.

*Phlegmasiæ*.—We cannot omit the curious facts reported by Dr. Gobée, in regard to the use of high doses of calomel in pneumonia (Schmidt's *Journal de méd.*, 15th vol., 2d part). This treatment had been advised by Hamilton towards the end of the last century, and later by Vogel. It is as follows: blood is first let, and soon after, calomel is given in the dose of from  $\frac{1}{2}$  to  $1\frac{1}{2}$  grammes in the twenty-four hours (gr. 8—23), in 12 doses. He increases the interval between the doses a little if no diarrhœa follows. If the cough is frequent, he adds extract of hyoscyamus to the calomel. A few days suffice to lessen the inflammatory symptoms, when the medicine is stopped. M. Gobée has observed that salivation very rarely occurs in pneumonia (*Bull. de thérap.*, octobre, 1837).

We have seen the happy effect of mercurials upon phlegmasiæ which were very dangerous from their extent, their seat, or their febrile reaction. There is no reason to doubt that this is the case with the other phlegmasiæ also, and we are hardly surprised at the confidence which our neighbors beyond sea bestow upon calomel in inflammation. The unanimous agreement in regard to the antiphlogistic properties of mercury which is found among such a mass of physicians as those of England, British India, and North America, compels us to believe that there is some truth there; and it is really deplorable that our countrymen have such prejudices against this heroic remedy.

*Diseases of the liver*.—The value of mercury in these diseases has become a sort of commonplace. A sort of tacit agreement exists among all physicians upon this point, and although well-conducted and conclusive experiments have not yet been published, it is still customary for mercurials to form a part of all treatments, whether empirical or rational, of those suffering from chronic disease of the liver. It is difficult for us to decide in this question, and we shall refrain from giving any opinion, until we have made experiments which satisfy us.

We have, however, recently observed certain facts which have im-



pressed us very favorably. We are acquainted with patients who have long suffered with a gastro-hepatic affection, quite hard to define, but accompanied with some congestion of the liver, and that painful condition vaguely known as hepatalgia.

Many remedies had been used without success in these cases, and they were at last cured by mercurials, which were given quite empirically. We can speak of a lady, among others, who had for years been tormented by an ill-determined complaint of the liver, termed an anomalous neurosis of the gastro-hepatic plexuses. This patient had exhausted everything without relief, when she met at the sea-side an English physician who ordered blue pills, which seem to possess a most remarkable fundent, laxative, and resolvent power. Under this treatment the disease, previously so painful and refractory, had in a short time completely changed its face, and a cure soon followed, as happy as it was unexpected. These results agree with the observations of Monneret, who has found benefit from blue pills in cirrhosis.

The English use calomel a great deal as a cholagogue cathartic in abdominal plethora and hepatic congestion marked by colorless stools, flatulent dyspepsy, paleness and sadness of countenance, which they call torpor of the liver, and treat it with Plummer's pills, which have a great repute across the Channel. These pills are composed of calomel, precipitated sulphuret of antimony, resin of guaiac in powder, and castor-oil. Each pill weighs  $\frac{1}{4}$  of a gramme and contains  $\frac{1}{20}$  of a gramme (nearly  $\frac{1}{2}$  of a grain) of calomel. They undergo alteration after a time, by the formation of sulphate of mercury and terchloride of antimony. The English also claim that the good effect of these pills is perhaps due to the antimony as much as to the mercury (Fonssagrives: *Bulletin de thérapeutique*, t. LXXI. "Du rôle du calomel dans la médecine anglaise").

*Diarrhœa*.—The English use calomel in diarrhœa with a boldness to which we are not used. In feculent or irritative diarrhœa they give a gentle purgative first, and afterwards, if the stools do not change, they give in the evening a large dose of calomel, and next morning castor-oil. It is the English habit to give calomel first and a light purgative afterwards, thus avoiding the alterant effect of mercury while employing it as a purge, a cholagogue and a deobstruent of the liver. In mucous or catarrhal diarrhœa, they also give at night, calomel with Dover's powder or sulphate of potassium, and the next morning, castor-oil; in serous or bilious diarrhœa they consider it as contra-indicated.

*Dysentery*.—The incontestable value of purges in most epidemics of dysentery, permits us to believe in the good effects of calomel, given internally. Experience shows that calomel given in the dose of 2 grammes (30 gr.), night and morning, is one of the most effective agents in treating this dangerous disease. Under this treatment the bloody and mucous stools quickly lose these characters. The cutting pain and tenesmus moderate, and the stools take the dark green color which always follows the administration of calomel. The use of calomel is not to be suspended



until the stools have taken this peculiar color. Does the medicine act here as a substitutive, and consequently by its local irritant power, or as an alterant? This is not easy to decide. We are led to think that the alterant action, in this case, has a subordinate part, for we never heard that mercurial frictions had ever been used to advantage in treating dysentery, unless perhaps by Boage (Gmelin: "App. med.," t. VIII., p. 95). To Dr. Amiel, surgeon-major of the 12th regiment of the English army, is due the credit of first clearly formulating this method.

He made several successful trials of it in an epidemic of dysentery, which prevailed among the garrison of Gibraltar, in 1812, and the statement of the physician in charge at the fortress attests the excellence of the method. May we suppose that it would be equally successful in all epidemics of dysentery? We doubt it; and it is sufficient to mention the plan, which will probably be useful in a great many cases. Dr. Roesch bestows high praise upon calomel in large doses in severe dysentery. He commences with a few leeches to the hypogastrium or anus, and follows them up by calomel in the dose of 20 (gr. iij.) centigrammes for children, and 50 centigrammes (gr. viiss.) for adults, in two doses, one in the morning and one at night; sometimes also one in the middle of the day. He associates the acetate of morphia in case of acute pain and tenesmus.—He uses calomel also in high doses, in typhoid fever (*Medizinische Annalen*, 1839).

In an epidemic of dysentery which raged among the garrison of Tours during the autumn of 1850, Dr. Frederic Leclerc had fresh evidence of the great value of this remedy. He begins with a small dose, 10 centigrammes (gr. 1·5) per day, in several doses, and raises the dose gradually until it reaches 40 and 50 centigrammes (gr. 6—7), unless there is considerable improvement after a few days of treatment. At the same time he covers the belly with extract of belladonna to quiet the tenesmus.

As regards the form and period of the complaint which call for the use of calomel, we will only say that, in acute dysentery, the leading phenomena—fever, diarrhoea, hæmorrhage, rectal spasm—are not always present in equal proportions. The malady is sometimes chiefly inflammatory and febrile, when bloodletting relieves more than anything else; sometimes spasm is prominent, requiring stupefiant injections; again, hæmorrhage is the chief symptom when purges are prescribed, especially those acting on the upper intestine or liver, like castor-oil and calomel. Morehead (cited by M. Fonssagrives) prescribes calomel during the first two or three days in persons enfeebled by previous disease. He gives at night a powder composed of

Calomel..... gr. 0·50 =7·5 grains.

Ipecac,

Opium ..... gr. 0·025 =0·4 “

and next morning, 16—30 grammes (  $\frac{5}{8}$  ss.—  $\frac{5}{8}$  i.) of castor-oil. We would



gladly accept this plan, but not the radical treatment which Annesley ordered in India, and which is now partly abandoned. Finally, acute dysentery may have the bilious character, and be quickly benefited by calomel, as M. Pécholier gave it in an epidemic, in 1864, at the hospital Saint-Éloi at Montpellier ("Des indications de l'emploi du calomel dans le traitement de la dysenterie," 1865, Paris). As for the adynamic or putrid form of dysentery, it contraindicates calomel and is much better treated with cinchona. The same indications may be followed in chronic dysentery.

*Neuroses.*—If we exclude from the neuroses cured by mercury those which are due to syphilis, the number will seem very small; it is therefore prudent always to look for syphilis in the antecedents of patients affected with neuroses.

A young attaché of the English embassy had had several venereal attacks, and thought himself cured, when he began to suffer from epileptic vertigo, and soon from general epileptic convulsions. Treated by the best physicians of London and Paris, he thought himself incurable, and planned to kill himself. He consulted Dr. Lebreton and ourselves. Nothing about him indicated the existence of syphilis, but he had several times been treated for that disease without mercury, and this led us to think that the venereal poison might be a cause of the nervous disorders of late years. We prescribed a regular mercurial treatment, and the disease disappeared; and for sixteen years the gentleman has not had the slightest suspicion of a disease which had rapidly become very alarming. In 1855 we had another equally rapid and complete success in the case of a Spanish-American, who, after a constitutional syphilis, had had daily attacks of epilepsy. Of course we do not infer that mercury cures epilepsy, but only that epilepsy may be due to cranial exostoses, vegetations of the dura mater, or any other appreciable or inappreciable lesion of the nervous system due to the venereal infection; and that mercury cures epilepsy, not by its anti-epileptic, but by its anti-syphilitic powers; and the same in certain paralyses, and mania, which are sometimes due to the same immediate material causes and the same remote cause as the epilepsy of which we speak. Thus paraplegia, hemiplegia, amaurosis, deafness, have been cured by mercury, when dependent directly or indirectly upon pox.

Certain neuralgias are in the same category. A rich banker of Paris, whose life had not been quite regular, had suffered for ten years from pains in the stomach and vomiting, which returned every evening and which nothing could relieve. A mercurial treatment was advised, rather from the memory of old attacks of syphilis than in the hope of cure. As soon as salivation began, the functions of the stomach were re-established, and from that time the health was excellent. In this case the pains and other symptoms were nocturnal, which was the only point of contact with syphilis that induced the prescription of mercury. We have also seen two women, one at the Hôtel-Dieu, the other in our private practice,

who had intolerable neuralgic pains of the face and forehead every day at a fixed hour, usually towards noon. Everything proved futile, until we gave mercury, when a cure was obtained in a few days. We had learned that these women had had syphilis, and had never taken any mercurial. We add that in 1836 and 1855 we attended two women affected with intermittent periodic diurnal neuralgias, accompanied by cranial exostoses. Mercury quickly cured them, though iodide of potassium had failed.

When a new remedy for tetanus is mentioned, a feeling of distrust naturally arises; for very few of us have seen patients recover from traumatic tetanus. This, however, is no reason for not making any trials, and for rejecting as apocryphal the cases of cure quoted by various authors (Gmelin: "App. méd.," t. VIII., p. 94). But in our time, Professor Forget cured a tetanus, not traumatic, but spontaneous, by mercurial frictions continued for five days in the dose of 30 grammes per day. This was at the clinic of the Faculté de Médecine at Strasburg, and in the presence of many pupils. Would he have succeeded equally in a case of traumatic origin? This must remain doubtful. Need we believe what Rush and Clarkson said ("Transact. of the College of Phys. at Philadelphia," vol. i., 1793) of the efficacy of mercurial inunction of the neck and jaws in tetanus; what P. Desault and Darlae said of the value of the same method as a preventive of hydrophobia (Desault "Diss. sur les maladies vénériennes," Bordeaux, 1733), and so many other authors, whose names may be read in Gmelin?

#### THERAPEUTIC ACTION OF MERCURIALS USED AS TOPICS.

Hitherto, we have seen mercury acting through absorption, and affecting the parts it benefits indirectly. Now we have to study it as a topic, that is, acting directly, modifying the tissue with which it is in immediate contact, and entering the system through the diseased organ. Of all the agents of substitutive medicine, there is probably none which receives more numerous applications than mercury.

*Non-syphilitic disease of the skin.*—The value of mercury in diseases of the skin is as unquestionable as it is in syphilis. This precious medicine was introduced as a remedy for skin diseases, as the writings of the Arabs show; and it was simply because its virtues had been solemnly recognized in leprosy, that it was used in syphilis, the most hideous of diseases next to leprosy. Many charlatans, seeing syphilis appear in the form of cutaneous disorders, and thinking that all diseases of the skin were due to the same cause, gave mercury empirically, with a success which opened the eyes of all physicians who were not closed to all truth. Mercurial ointments have long been, and still are the most popular secret remedy for chronic diseases of the skin.

We may say of sublimate, as a topical remedy, that it is supreme in



the treatment of cutaneous diseases; and there is little exaggeration in claiming that mercury by itself suffices in the treatment of almost all these affections. The Neapolitan ointment, red precipitate, calomel, corrosive sublimate, cinnabar, the iodides of mercury, etc., are very powerful weapons which we should learn well to handle. Among these, the sublimate is certainly the most heroic, and does more service than all the rest together.

Baumé was the first to give it in baths, for diseases affecting the greater part of the skin. He was probably led to this by having experimented with lotions of sublimate, and with certain secret remedies, particularly the anti-dartrous water of the Cardinal de Luynes, which was merely a solution of sublimate. He had also seen the rapidity with which the phagedænic water, used as a lotion, cured dartres, especially those which are accompanied with itching.

These baths, prescribed at first in the dose of from 4 to 8 grammes (3 i.—ii.) to 300 litres (quarts) of water, fell into disuse for diseases of the skin; but they were readopted by Wedekind (*Heidelberger klinische Annalen*, 1829, v., 537), which brought them back into credit. They were not naturalized in France until we had tried them on a large scale at the Hôtel-Dieu in Paris during the years 1831, '32, and '33, showing to a demonstration the remarkable efficacy of baths of sublimate in the chronic diseases of the skin, whether of syphilitic origin or not. The baths which we order in this case contain at first 15 grammes (225 grains), which is gradually increased to 30 or 60 grammes (about 5 i.—ii.). The dose for women is always less by a half.

Independently of their curative action, these baths produce an effect on the skin and the entire system which is important. The first taken may cause heaviness of the head and an invincible tendency to sleep, sometimes light spasms of the stomach and very slight colics, rarely followed by vomiting or diarrhœa. These phenomena cease after the first baths, and a second set appear, ordinarily a papular eruption on the legs, which is quite like lichen agrius, and produces severe itching or smarting. This eruption is not dissipated by successive baths, but increases, and often forces us to give up the baths.

We never give the baths so as to produce salivation, unless it be for the relief of syphilitic symptoms. We order them to be taken every other day, and usually a bath of bran-water on the intervening days.

Great care should be taken never to give to a patient sulphur-baths and sublimate-baths at once, nor to order mercurial baths directly after those of sulphur, as the skin becomes of a brown-black, which persists until the entire epidermis has fallen.

In default of baths, lotions of sublimate are used for the same purpose. The formula most used by us is the following :

Corrosive sublimate .....	10 grammes=gr. 150
Alcohol .....	100      "      = 3 xxv.

Of this solution, a teaspoonful in 500 grammes (1 pint) of very hot water for lotions. The proportion of the solution may be increased or diminished according to circumstances.

The anti-dartrous water of the Cardinal De Luynes formerly enjoyed a great reputation for the cure of skin diseases. In England, the perfumers sell a wash celebrated among women for curing acne rosacea and the diseases of the skin of the face; it is composed as follows:

LIQUOR GOWLANDII (CODEX)—GOWLAND'S WASH.

Bichloride of mercury.....	1 part.
Muriate of ammonium.....	6 “
Emulsion of bitter almonds.....	480

*Pityriasis capitis*.—There is a form of pityriasis of the scalp which is very common in young girls from fifteen to twenty years old, at the period when the hair develops; this is promptly cured by the following pomade:

Beef marrow .....	20 grammes=gr.	310
Lard.....	4 “	= “ 62
Tincture of cantharides.....	0.60	= “ 9 $\frac{1}{4}$
Calomel.....	0.25	= “ 3 $\frac{1}{2}$
Essence of bitter almonds.....		2 drops.

*Malignant pustule; cauterization with sublimate*.—In an extended paper on this disease, addressed to the Medical Association of Eure-et-Loir, by Dr. Salmon of Chartres, the author, after explaining the use made of different caustics, as the actual cautery, nitrate of silver, potassa, etc., recommends especially the sublimate, which the physicians of Beauce, where charbon is so common, make very great use of. In our country, says he, corrosive sublimate enjoys the most extensive reputation; it has become the usual remedy in malignant pustule, owing to the communications made by MM. Poulain, Vaucoret and Harreaux, who have made experiments with it. The curers themselves, those who refuse to give the public what they call their secret, are driven to color their drug red, green, or otherwise, in order not to seem to do as every one else does. Their secret is, nevertheless, nothing but bichloride of mercury.

Although the remedy is so generally used in the country, the methods used by physicians differ.

M. Montagnier, who practised at Gallardon twelve years ago, and had a wide local reputation for curing charbon, operated as follows:

He made little diachylon plasters about as large as a two-franc piece, incorporating a large quantity of sublimate with the diachylon, and sprinkling its softened surface with lumps of sublimate just before applying to the skin. This first plaster was kept on the skin six hours, after which a second, more heavily charged, was applied, and left on for twelve hours. When rapid action was necessary, he scarified with the lancet the first



eschar obtained. In all cases, after the second plaster he made a circular incision in the tumor with the bistoury. He afterwards dressed with styrax, pure or mixed with sublimate, in small proportions.

M. Vaucoret, a physician at Denouville, whose father also enjoyed at Beauce a deserved reputation for his success in treating charbon, operates more simply. When the patient presents himself, he first makes a crucial incision in the tumor with the lancet, down to the healthy, that is, the sensitive parts, which should not much exceed a centimetre ( $\frac{4}{10}$  inch) for each side; then with a bistoury or curved scissors he removes the four lappets produced by the incision. A cup results, the bottom of which is at the central point of the pustule, and the edges answer to the sound tissues. A good deal of blood usually escapes, which is stanchèd with charpie or cotton before the pounded sublimate is applied; the cup is filled with the powder, and a plaster is put on over all. The amount of sublimate used may be one or two grammes (gr. 15—30).

Twenty-four hours later, if the patient has suffered much (which shows that the caustic has reached the sound parts), if a proper eschar has been formed, if around the eschar there is a circle of vesicles containing a sero-purulent liquid, showing a return to the normal function of the diseased parts, the accidents produced by the malignant pustule are checked; but if the patient has suffered little or not at all, if the circle of blisters has not been formed, it is important to recommence the above cauterization.

Dr. Missa states that during ten years he has used no other remedy, and that in more than 300 cases he has failed but twice. In one, the patient did not appear till the seventh day of the disease, and in the other, the patient was already infected ("Union méd.," 1863).

Phagedænic water may replace sublimate with advantage whenever the action of the mercury must be exclusively topical. It is mixed with hot water in the proportion of one-sixth, a quarter, a half, and, with the mixture, repeated and quite prolonged lotions are made. Before using the water, the bottle must always be well shaken.

Cinnabar, being insoluble, is not so convenient to use; yet it is employed in analogous circumstances.

The topical uses of cinnabar were formerly little known. Gmelin, in his "Apparatus," cites but few authors who thus used it. It was used for the itch, tinea, and other chronic affections of the skin ("App. med.," t. II., p. 129). At present it is used only in fumigations. It is volatilized on a plate of platinum or porcelain, and the vapor is directed to the parts to be cured. A fumigating-box is commonly used, with holes to introduce a limb, or to which a surface of the body is applied. When it is thought fit, for a general cutaneous disease, to give general fumigations, the person is put in a box, his head alone being outside. This apparatus was invented by Lallouette, at the end of the last century, and is daily modified to suit the idea of the physician and the special indications.

Fumigation with cinnabar as a local remedy is particularly useful in

cutaneous syphilidæ; it is also of great use in phthiriasis, a multiple eruption, caused by the presence of lice. The doses of cinnabar vary from 50 centigr. to 8 and 12 grammes (gr. 8 to 3 ii.—iii.), according to the extent of surface to be treated, the capacity of the apparatus used, and the sensibility of the parts.

*Acute suppurative phlegmasiæ.*—The acute, as well as the chronic diseases of the skin, have been topically treated by mercurials.

Phlegmonous erysipelas of the limbs and panaris have been advantageously treated with high doses of mercury, in topical applications, or given internally so as quickly to affect the system.

M. Serres, of Alais, is the chief advocate of the local use of mercurial friction in erysipelatous and erysipelato-phlegmonous inflammations. The extent of his applications depends on that of the disease; he does not hesitate to use 250—300 grammes ( $\frac{7}{8}$  viii.—ix.) of double Neapolitan ointment in the space of 48 hours. After this period the inflammation usually recedes, when the remedy should be suspended; but, if this favorable turn does not occur, the treatment must be persisted in without fear of salivation, which does not usually occur until the fourth or fifth day (*Gaz. méd.*, 1837, No. 33; *Bull. de thérap.*, 1833, t. IV.; 1837, t. XII.).

M. Serres has used the same treatment in panaris. By rubbing upon the finger, before the suppuration commences, double mercurial ointment every quarter of an hour, or, more simply, by enveloping the finger in a mass of Neapolitan ointment, he causes very threatening panaris to abort (*Bull. de thérap.*, 1833, t. VI.). Traumatic phlebitis, due to venesection, is cured by analogous methods (Picard: *Bull. de thérap.*, t. XIV., 1838). Even an acute eczema caused by local application of a mercurial ointment is very easily cured by washes of sublimate.

*Variola.*—Mercurial inunctions have been recommended in small-pox. The face is covered with Neapolitan ointment, and it is claimed that by this means erysipelatous tumefaction of the skin of the face and eyelids is avoided. The physician of the hospital of Trompeloup is an authority for stating that this is the most efficient remedy for preventing the swelling of the lids. M. Goblin, of Stains, claims to be able to make the pustules abort, by making frequent frictions with mercurial ointment upon the affected parts from the commencement of the disease. We shall not go so far as he does, but we can affirm that the application, made at the beginning of the disease, singularly lessens the eruption and the consecutive cicatrices.

The internal use of mercurials in variolæ has received a much more solemn sanction. There are numerous attestations of its value; Huxham, Boerhaave, Van Swieten, Cotugno, are agreed that it is useful, either through its antiphlogistic action, as in peritonitis and rheumatism, or by attenuating the variolous virus, or by favoring the salivation which, as we know, is so useful in confluent variolæ (Gmelin: "Appar. med.," t. VIII., p. 63).

As we have mentioned the local and general action of mercurials in



variolaë, we must mention the statements made regarding the action of emplastrum de Vigo cum mercurio upon pustules with which it comes in contact.

The honor of this discovery is disputed by several physicians, but it is due to Zimmermann and Rosen. We read in the *Traité de l'expérience*, translated by Lefèvre (t. II., p. 206):

“A lady, who for good reasons had placed an emplastrum de Vigo upon a certain part, was salivated, and afterwards had the small-pox, when her whole body, except the part which was defended by the mercury left by the plaster, was covered with pustules. M. Malonin has asked whether the small-pox might not be prevented by this means. This experiment has not been made; but a means for preserving the faces of women who have the small-pox has been derived from it. M. Rosen covered the face of one of his female patients with a mercurial plaster, and the disease left marks everywhere except on the face.”

*Diseases of the mucous membranes and the eyes.*—While the utility of the mercurials is so incontestable in chronic diseases of the skin, it is equally positive in chronic phlegmasiæ of the mucous membrane. The deutoxide of mercury forms a part of almost all the anti-ophthalmic pomades, which were at first the secret of charlatans, and now are used daily by the most enlightened physicians; thus, the pomades of Desault, Régent, Richter, Dupuytren, Lyon, etc., owe their curative virtues to red precipitate. The sublimate, cinnabar, the iodides, may be mingled with fat and used in the same circumstances. These fatty collyria are specially of use in affections of the lids; when the conjunctiva is more particularly affected, dry collyria with powdered sugar and calomel, or red precipitate; and liquid collyria with a solution of sublimate, occupy an important place in the therapeutic arsenal of ophthalmology.

For some years the red oxide has been replaced by yellow precipitate, or hydrated binoxide of mercury, obtained by precipitation, by treating a solution of bichloride of mercury with potassa. Pagenstecher of Wiesbaden and Von Graefe of Berlin have used it in preference to red oxide, because it occurs in very fine powder. The most usual pomades are made as follows:

Hydrated binoxide of mercury (yellow precipitate). 1 part.  
Cold-cream without volatile oil, or glycerolate of  
starch..... 8 parts.

This is most used in lymphatic and scrofulous ophthalmia.

M. Jacquet of May incloses a similar pomade in little tin tubes to keep it from turning rancid. His formula is:

Hydrated binoxide of mercury..... 1  
Lard..... 15  
Oil of sweet almonds..... 5

—(Société de thérapeutique, 1872).

*Diseases of the nasal fossæ.*—Ozaena, due to syphilitic ulceration or simple chronic inflammation of the pituitary membrane, is beneficially modified by frequent inspiration of mercurial powders in the proportion of 1 or 2 grammes of calomel to 15 grammes of sugar, or  $\frac{1}{2}$ —1 gramme of red precipitate to 15 grammes of sugar. The injection of sublimate acts similarly.

It is, however, proper to assist this treatment by close attention to cleanliness, especially by the injection of a weak solution of nitrate of silver or sulphate of copper into the nasal fossæ; of the strength of 5—50 parts to 10,000 of distilled water.

*Diseases of the ear.*—Mercury renders the same services in otorrhœa, in dartsous phlegmasiæ of the external auditory meatus.

*Diseases of the larynx.*—We often make use of a powder of sugar-candy ground fine, with a 15th or 20th of its weight of calomel, in order to modify a chronic inflammation of the laryngeal mucous membrane.

*Pruritus vulvæ.*—The injections and washes of sublimate or phagedænic water have a most remarkable efficacy in this complaint, which is so closely related to darts, and which torments the life of so many women. We prescribe as follows:

Ten grammes of bichloride of mercury are dissolved in 100 grammes of alcohol. A teaspoonful of this solution is put into half a litre (a pint) of very hot water; and this is used for injections and washes. We often insist on the necessity of having the water very hot, and not without reason. It is remarkable that lotions of sublimate act much less vigorously when the water is cold than when it is very hot, and the treatment is often quite ineffectual because cold water is used. Phagedænic water is prescribed in the same circumstances, in the proportion of a quarter and even a half.

*Parasitic animals, intestinal worms.*—The action of mercury upon the economy is evidently of a toxic nature. Its effects are still more sensible upon the lower animals, especially those living in the interior of man, or on the skin or in the hair. Curious experiments made by Gaspard, recorded in Magendie's *Journal de physiologie expérimentale* (t. I., p. 105) prove this conclusively.

“Several eggs were placed in incubation in vases, at the bottom of which was mercury, so placed as not to touch the egg, but only to reach it with its exhalations. During six weeks, the fetuses of ten eggs had developed for two days or a little longer; they were all found to have died at that period, at the moment of the formation of the blood, which could in some cases be seen. Two healthy hens (the egg being in the sixth day of incubation) exposed only to the emanations of mercury, without direct contact, died in twenty-four hours.

“In June, 1875, a piece of meat covered with eggs of blow-flies, was placed over mercury under favorable conditions of moisture and temperature; not a single fly was hatched, while hundreds were developed in corresponding experiments made without mercury.



“Eggs of the chimney-cricket, some new-laid, some more advanced, and some containing formed foetuses, with distinct eyes and limbs, were placed in direct and indirect contact with mercury, and not one hatched out; while all in a corresponding experiment, made without mercury, produced little crickets at the full term. The first being opened, the foetuses were found dead, and the liquids decomposed.”

M. Bouchardat has laid before the Institute the result of experiments made by him concerning the effects of various poisons. He proves that the soluble preparations of mercury are general poisons; no plant, or animal, in his experiments, resisted their influence. Solutions of a thousandth part of bichloride of mercury rapidly poison plants. Leeches and fishes plunged in the same solution are affected instantly, and die in a few minutes.

Of all the mercurials, the biniodide seemed the most deleterious. A milligramme of this salt was dissolved in 1,000 grammes of water (1 part to one million), by the aid of a milligramme of iodide of potassium; four small fishes were introduced, a *cyprinus lobula*, a *cyprinus gobio*, and two *cyprini amari*. The two first died in three quarters of an hour; the others lived a few hours. If the action of arsenical compounds be compared with that of mercurials, we find that a fish lived six days in water containing 1 gramme of arseniate of sodium to the litre (1 part to 1,000; whence we may conclude that the biniodide of mercury is at least a thousand times as poisonous to the lower animals as arseniate of soda. M. Bouchardat states that biniodide is the most injurious of the mercurials; next comes the bichloride, and next the cyanide.

To these facts we will add others which prove still more clearly, if possible, the deadly effect of mercury on insects, and especially on the parasites of man. They are stated upon the responsibility of M. Fayard, a pharmacist of Paris, who communicated them to us.

A seedsman of Paris, one morning, found his shop and all his wares infested with innumerable quantities of lice. The poor man, who could not account for such an occurrence, and thought an enchantment had been cast upon him, went piously to the curé of Saint-Vincent de Paul, to beg for his intercession and advice. The pastor was a man of much intelligence, and was incredulous of enchantment; he told the good fellow to go to a neighboring apothecary, who could give him some drug more powerful than holy water. This druggist was M. Fayard. He went to the shop, but dared not enter, such was the number of lice on the floor. He could not explain this incredible multiplication of insects, but planned a means for destroying them. A lighted chafing-dish was set in the midst of the floor, and on this a capsule of porcelain containing a pound of crude mercury; the doors were then closed, and at the end of twenty-four hours, when they were opened, all the lice were dead. The source of this singular misfortune was then sought.

At the end of the shop a bag was found, almost filled with dead lice. It appears that a few had been left in the bag of bran at the miller's;

they had quickly multiplied in the bran, until they had eaten it all, when they escaped by a hole and deluged the shop. It is well known that the bedbugs in a room may be destroyed by volatilizing 50 or 60 grammes (3 xii.—xv.) of cinnabar, and keeping the room well closed for two hours. Thorough ventilation must be subsequently made, and the room left uninhabited for a day or two.

Mercury was first used in medicine to destroy parasitic animals, as the writings of the Arabs show. Experience confirms this; ointments containing mercury destroy at the same time head-lice, body-lice, and crab-lice. But for those of the head we prefer in general pomades made of purified lard, slightly perfumed, with a small proportion (one twenty-fourth) of red precipitate. For the other two kinds we order a general bath, in which we place 30 grammes (nearly  $\frac{3}{4}$  i.) of sublimate previously dissolved in alcohol.

Upon equally just grounds mercury is used as an anthelmintic. It kills the worms by its toxic properties, and expels them by purging. Although this remedy is evidently one of the best for destroying lumbrici, it is by no means equally effective against tænia. Gallaudet also praised mercurial frictions as the most effective means of destroying the guinea-worm (*Journ. de méd. chir. et phar.*, t. XII., 1760).

*Oxyuris vermicularis*.—Calomel is more certain in its action upon these parasites than upon lumbrici or tæniæ.

For adults we prescribe an injection of a pint of fluid containing 5 centigrammes (gr. 0·8) of biniodide of mercury dissolved by the aid of  $\frac{1}{16}$  of iodide of potassium, or the same dose of bichloride of mercury. Children require only one fourth or fifth as much. We have rarely seen this treatment fail. Such an injection may be taken two or three days in succession; a fortnight later one or two more may be taken, and the same again after four or five weeks.

## IODINE.

*Goître*.—Coindet made his first use of iodine in goître; at the beginning of his practice he cured, says Coster (*Arch. génér. de méd.*, t. II., p. 431), nearly two-thirds of 100 patients reported by Coster. Brera ("Saggio clinico sull' Iodo," Padua, 1822), published results confirmatory of Coindet's, though less brilliant than those reported by Coster. Janson of Lyons (*Arch. gén. de méd.*, t. IV., p. 77), Angelot (*Ibid.*, t. XII., p. 135), and many others, whose names and works are given in Bayle's excellent compilation ("Biblioth. thérap.," t. I.), all bore witness to the same effects. But in London, Paris, and some of the large German cities, the results were by no means as good as in Switzerland and Italy. This is due to some circumstances which it is very important to mention here. There is a great difference between the goître of the Alps, and that which originates at Paris, for example; this is shown by the nature



of the anatomical lesions seen at the autopsy. Lèveillé, Eymery, Fodéré, Itard, have shown that goître contracted in mountainous countries often gets well when the patient merely returns to a country where it is not endemic (*Arch. génér. de méd.*, t. XXII., p. 135); and Itard saw at Lausanne a boarding-school for English boys, where almost all the pupils were affected with goître, but were receiving no treatment, because it was known that the disease would leave them when they returned home. This goître is only a hypertrophy of the thyroid gland, and therefore is easily cured. There is, then, nothing extraordinary in the results of Coindet, Costa, Brera, and Angelot, whose observations were made in countries where the disease is epidemic. Those seen at Paris and elsewhere are not usually simple developments of the thyroid, but schirrous, encephaloid, tuberculous, osseous, cretaceous, cartilaginous, cystic degenerations. Need we be surprised that iodine does not succeed so well, and sometimes even gives rise to local accidents by hastening purulent formation in these products? In therapeutics, charges of ill-faith are very often exchanged when the remedies have simply not been applied to the same diseases.

There has been much discussion, and yet nothing is positively known about the cause of goître. Some ascribe it to meteorological or orographic conditions, others to the use of snow-water, etc. M. Grange, of Geneva, has lately published interesting papers on the cause of cretinism and goître, and the means of preserving the population from them, in which he tries to show that they are due to magnesian soils, and water rich in magnesian salts. In his map of the distribution of goître and cretinism, in France, we find, contrary to the usual belief, that goître occurs in the level lands; it is endemic in the Oise, the Aisne, the Somme, the Nord, and in the regions where the mountains are of moderate height—the Vosges, the Lyonnais, the Jura, the Drôme, etc.

The author has shown that no relation exists between scrofula and goître. In fact, the countries where goître is the worst are those where the scrofulous vice is least general; as in the Pyrenees (*Académie des sciences, séance du 29 avril, 1850*).

We think that before M. Grange's opinion is received, numerous analyses of the bones and the tumors of goïtrous persons should be made.

The first researches of M. Chatin showed that iodine exists not only in sea-water, but in fresh water as well. Nevertheless, water at its source is usually destitute of it, and rivers acquire it by traversing land which contains it, and by receiving the organic débris of plants and animals. He shows that iodine is a necessary element of man's body, furnished by the water of the rivers and wells he drinks from. If man drinks in the mountains water furnished by melting snow, which has not had time to become charged with iodine, he is in an abnormal state, from which several maladies result, and particularly goître.

Pursuing these beautiful researches, M. Chatin has proved the existence of a certain proportion of iodine in the atmosphere. This is fixed

in the animal body by the act of respiration. Analysis shows that the expired air contains only about one-fifth as much as inspired air.

The air of badly-ventilated and crowded places is partly deprived of iodine.

Rain-water is much richer in iodine than other sweet water. The proportion of iodine in rain-water approximately shows the proportion in the air in a given country, and may furnish a means of analysis.

Snow and dew are ioduretted, but less so than rain.

The chief source of the iodine in the air is the water, which continually tends to give off the whole (in fresh water) or a part (sea-water) of its iodine.

In order to draw some practical conclusions, M. Chatin has divided France into zones, according to the degree of iodization, and he shows how to re-establish the equilibrium between them, by transferring the resources of one zone to another. He recommends, for instance, iodification of the soil by manures, by irrigations, by using the mineral springs containing iodine, and by iodizing the food of animals which are eaten by man.

M. Chatin has also found that fermented liquors, wine, cider, perry, etc., are richer in iodine than ordinary fresh water is; that milk, especially that of the ass, is very rich in iodine, and eggs have so large a proportion that one egg, weighing 50 grammes, contains more than a quart of cow's milk, and as much as two quarts of wine or good water.

Iodine has been found in large quantity in fresh-water animals, especially crayfish, frogs, gudgeons; also in fresh-water plants, cress, phillandrium, anagallis, especially when growing in brooks. In general, plants growing in running water are richer in iodine than those growing in stagnant water.

Most substances, whether from the animal or the vegetable kingdom, which are offered to us as pectorals, anti-scorfulous and anti-scorbutic remedies *par excellence*, are rich in iodine. As in many other cases, so here, observation did not wait for chemical analysis before recognizing the virtues of these popular remedies; yet we are fortunate in seeing that science sanctions them, and converts an empirical into a rational reputation.

In conclusion we would say, that M. Chatin, thanks to his elegant researches, has reached another and a most important conclusion, namely: that two of the greatest of human infirmities, one of the body (goître), and the other of the mind (cretinism), are chiefly caused by absence or deficiency of iodine in the air and water, and that, consequently, the remedy for this double scourge consists in restoring to the system this principle, which is indispensable to it, as iron is; and that the best method consists of a regimen in which iodized drinks and food occupy a leading place.

The internal administration of iodine is not our only resource; it has been thrown directly into the tumor.



The iodized injections were first used in cystic goître (Maunoir, of Geneva, Velpeau, Boinet, etc.), and with very good results. In a recent statement by M. Patritti ("Thèse de Paris," 1872), we find that among 35 cases of cystic goître thus treated, M. Fleury, surgeon of the Hôtel-Dieu of Clermont-Ferrand, has obtained 12 cures, without accident, 18 cures after inflammatory symptoms of various degrees of severity, and only 5 failures.

The method has lately been extended. Professor Luton, of Rheims, has obtained very remarkable results in four cases of goître, by injecting thirty drops of tincture of iodine into the parenchyma of the tumor. Very slight inflammatory symptoms were produced, and the patients recovered (*Archives de médecine*, octobre, 1867).

Since then M. Luton has greatly extended his practice, and always with the same success. He has been followed by several physicians, including MM. Bertin, de Gray, and Lévêque. In the thesis of the last named we find the following summary of the results of interstitial injections of tincture of iodine, practised in goître by the three physicians:

*In 48 patients.*

Goître of all classes completely cured .....	32
Very much improved.....	9
Improved.....	9
Result negative.....	2

A treatment which gives such good results will certainly soon be generally adopted.

*Serofula.*—The value of iodine in goître, which is generally classed by pathologists among strumous affections (though wrongly, as we think), led Coindet and Brera to use iodine in the other forms of serofula: engorgements and ulcerations of the lymphatic ganglia of the neck, mesenteric atrophy, white swellings, etc. (*Biblioth. univ. de Genève*, t. XIV. and XVI.; *Arch. gén. de méd.*, t. II., p. 430). More lately Sablairolles (*Nouv. biblioth. méd.*, t. II., p. 385, 1823), Benaven, (*Revue méd.*, 1824, t. IV., p. 83), Gairdner (*Revue méd.*, t. I., p. 490), Manson (*Recherches sur les effets de l'iode*, etc., London, 1825), and many others, whose works are analyzed in Bayle's *Bibliothèque thérapeutique*, have also praised the virtues of iodine in serofula. But Lugol, physician at the hospital Saint-Louis, has certainly done the most to popularize its use in serofulous disease. He published in 1828 a first mémoire on the subject, describing the good effects of iodized baths, which he preferred. Among 169 serofulous patients treated by him with iodine only during six months, in the unfavorable circumstances which are usually found in hospitals, 36 were perfectly cured, and 30 were remarkably improved.

Lugol's results did not at first escape the charge of exaggeration. It was difficult to admit that, in profoundly cachectic subjects, with severe and old alterations of the bony system, iodine had the privilege of cur-

ing after every other agent in the *materia medica* had failed; and further doubt was thrown on these miracles by the unlucky fact that the hospital Saint-Louis seemed to be their only stage.

Nevertheless, light has grown in these twenty-five years, and experience has spoken. Doubtless there was exaggeration, and even mistakes were committed, as happens at the beginning of every experimental research. But, let us not fear to say with one of our most impartial writers, that when we see the advance made by iodine, and the increasing part it plays in the air, the water, and the soil, Lugol must be acquitted of too passionate a predilection for this agent, the supreme importance of which he had hardly suspected.

Surely no one to-day will be disposed to admit in iodine that specific and almost infallible virtue which was ascribed to it indiscriminately in all forms of scrofula, from simple adenitis to caries of bone and tuberculous degeneration of the mesenteric or other glands; but, on the other hand, it is attested that the *materia medica* possesses no more potent modifier to combat that numerous class of morbid forms which depend upon lymphatism; nor can we deny that in many cases it has a real power over the scrofulous diathesis itself.

Thus, it is certain that, when the lymphatic glands are not changed into tuberculous matter, and when the period of inflammation is past, the internal and external use of iodine produces a more rapid resolution than any other remedy can effect. It is the same with articular tumors, before they are associated with tubercular degeneration marking their termination, and particularly when the lungs are not tuberculous.

M. Bazin: "*Scrofule*," 2d edition, 1861, regards iodine as an excellent remedy in the first stage of scrofula; he thinks it capable of driving off or ameliorating the secondary symptoms. He uses it in the form of antiscorbutic syrup, of iodized syrup of horse-radish, and syrup of iodide of iron.

In scrofula he uses externally iodine, iodide of potassium, iodide of lead, and iodide of sulphur. For the symptoms which he calls ternary or quaternary, he relies on cod-liver oil rather than iodine.

Among the various accidents of scrofula, there is one which often baffles treatment; that is, chronic adenopathy. We very often see patients who have escaped from all the accidents of scrofula and regained a strong, sometimes even a sanguine constitution, but who have in the neck, or the angle of the jaw, or at the level of the parotid, enlarged glands, not painful, the volume of which deforms the features and annoys the possessor. At this period iodine given internally is without effect; the pomades do not act; and the physician often gives up the disease to itself. We ought to mention two remedies which have already had some success; the one is metallic iodine covered with a layer of wadding (Prieur: *Acad. de médec.*, 1864), or the iodized cotton of M. Méhu; and the other, electricity, in the form of the constant current, which has sometimes produced very good results.



Another most grave scrofulous affection, caries of the vertebræ, or Pott's disease, has been relieved by preparations of iodine. Dr. Patter-son, of Dublin (*Journal des conn. médico-chir.*, t. I., p. 123), M. Abeille, and we ourselves, have seen the cure of such cases.

*Lacteal engorgement of lying-in women.*—M. Rousset, of Bordeaux, trusting in the resolvent powers of iodide of potassium, has given it to women just after confinement, who do not give suck and are plagued with full breasts. He gives it in the dose of 0·35 to 0·45 grammes per day (gr. 5·39—6·93). He says that under this treatment the engorgement rarely lasts more than three days or ends in an abscess. Billi, of Milan, claims to have obtained the same success (*Bulletin de thérapeutique*, 1863, p. 65).

*Iodized injections.*—*Hydrocele.*—In the past twenty years iodine, in the form of injections, has won an important place in surgery. There is scarcely any cavity, natural or accidental, into which this remedy has not been forced, for the purpose of causing adhesion of the walls, or of modifying the inner surfaces and producing resolution of a morbid state of the organ, whether acute or chronic inflammation, or vices of secretion, etc.

Of those who have most aided in extending this method, we place in the first rank MM. Velpeau, and Martin of Calcutta, next MM. Boinet, Borelli of Turin, Jobert de Lamballe, Abeille, etc.

The method was first employed in surgery for injections of tincture of iodine into the tunica vaginalis. In this special case they were proposed and praised by M. Velpeau, Martin of Calcutta, O'Brien (*Gazette méd.*, 1838), Oppenheim (*Bulletin de chir.*, 1839), and many others.

But the credit of the initiative, and of experiment upon a grand scale at the hospital of la Charité, is due to Velpeau.

Since then there is scarcely a surgeon who has not repeated his experiments with advantage; and the use of tincture of iodine in injections has now completely supplanted that of wine in the radical cure of hydrocele.

“It seems to me proved,” says M. Velpeau (*Annales de la chirurgie franç. et étrangère*, avril, 1843):

“1. That tincture of iodine provokes adhesive inflammation of the closed cavities with as much certainty as any other liquid.

“2. That it involves less risk of purulent inflammation than wine.

“3. That it distinctly aids the resolution of simple engorgements complicating dropsy.

“4. That if it enters the cellular tissue, it cannot cause gangrenous inflammation.”

Encouraged by his success in dropsy of the tunica vaginalis, Velpeau has injected iodine into many other closed cavities, normal or accidental, containing serum, or even blood in an altered but liquid condition.

He even ventured to inject tincture of iodine diluted with water into the synovial sac of the knee, and hernial sacs communicating with the great peritoneal cavity, and no accident followed.

The surgeon of la Charité has to-day some hundreds of observations, which incontestably prove the value of iodine in these cases.

He commonly uses a mixture of two parts of water to one of tincture of iodine. M. Jobert, who has injected into purulent cavities, commonly uses the pure tincture.

A. Bérard also preferred injections of iodine for hydroceles, and, in general, for the affections in which Velpeau praises it. He justifies his preference by more than 200 successful cases. He has five times injected iodine into the femoro-tibial articulation, without causing serious symptoms. He uses equal parts of tincture of iodine and water.

M. Faurès ("Comptes rendus de la Soc. médic. de Toulouse," 1861) has repeated the procedure of Martin of Calcutta, which consists in simply injecting a few drops of tincture. In a case of double hydrocele in a canon, the cure was complete on the tenth day. But might not this method cause gangrene of the scrotum?

*Hydarthroses, dropsy of the bursæ mucosæ, articulares and tendineæ.*—Led by the success of the previous treatment, surgeons and veterinarians have rivalled one another in making these injections into various closed cavities, natural or accidental. Thus, at first they were utilized in various sorts of serous cysts (*Bulletin de thérapeutique*, 1841); then in certain large abscesses (*Gazette médicale*, 1846).

In 1847, U. Leblanc, one of our most distinguished veterinarians, in concert with Dr. Thierry, made iodized injections into the various synovial tumors of horses; they find that the inflammation was usually moderate and slightly painful, while it was sufficient to prevent the return of the lesion.

M. Reynaud regards iodine as a much more active agent than ordinary resolvents, and free from the inconveniences of other modes of treatment. Long before MM. Velpeau and Ricord employed tincture of iodine in hydrocele, it was used at the naval hospital of Toulon, in dropsy of the mucous bursæ. Within a few days the complete resolution of old voluminous hygromas is almost always secured, without bad consequences. If there is inflammatory swelling of the neighboring parts, this is relieved by proper means; afterwards, the patient is subjected to a somewhat severe diet, the limb is placed completely at rest, and every morning and night, or three times a day, friction is made with 8 grammes of pomade composed of

Iodide of potassium..... 8 grammes = 3 ii.

Lard..... 30 " = 3 i.

Dissolve the iodide in a little water, and add the lard.

After each friction, the part is covered with a large linseed-meal poultice. Some results obtained with iodide of lead, lead us to think the latter more efficacious than iodide of potassium. After a few days, the skin, at first yellow, then brown, wrinkles, tans, and falls in scales. The tumor



grows soft, divides into several lobules, and soon disappears wholly. There remains then, at the point which it occupied, a little thickening, which disappears of itself after a few frictions, so that, at the end of the treatment, the part is restored to its normal state.—The usual duration of this treatment is two weeks.

M. Cabissol mentions eleven observations which fully establish the superiority of iodine to the resolvent metals in the treatment of dropsy of the mucous bursæ (*Bull. de therap.*, t. XIV., février, 1838).

Since then, the little tumors called ganglia have been universally treated by injections into the cyst as well as by frictions with iodine. The pure tincture is commonly used for the injections. Professor Borelli, of Turin, has been among the most successful in this mode of treatment. In a paper published in the Sardinian *Gazette médicale* (1852) he quotes some observations which attest its efficacy as well as its harmlessness.

In those rather frequent cases in which hydarthrosis resists internal and external treatment, and especially blisters applied to the seat of swelling, injections of iodine into the articular cavity offer a valuable resource, which must not be neglected. Some surgeons, including Velpeau, disregarding the danger of the entrance of a few bubbles of air into the articular capsule, puncture with a very fine trocar; but most, in order to avoid this accident, however trifling it may be, prefer to use the subcutaneous method. Present experience has shown that iodized injections made into the joint-cavities according to the rules given by Velpeau, Bonnet, Abeille, Robert, etc., commonly involve no danger, and in a very large majority of cases produce resolution of the fluid and a cure, provided the disease be not complicated by deep alterations of the soft or hard parts. Some good cases of M. Robert's have lately placed this beyond question.

At the beginning it was thought that iodine cured by provoking adhesive inflammation, but Hutin's recent cases tend to show that adhesive inflammation is usually absent, as in the case of hydrocele, and that the iodized injections simply modify the synovial membrane in a specific way, and restore the normal condition of the secreting surface. If adhesions occurred, we could not explain how articulations which remained immovable up to the time of the injection should regain their mobility in proportion as the effusion recedes. It is probable that the same thing occurs which has been seen, not only in the tunica vaginalis, but in ovarian cysts treated with iodized injections, in which the autopsy has shown a complete absence of adhesions between the surfaces, or only partial adhesions; in which, therefore, the cure was due to the gradual retraction of the walls of the cyst until the accidental cavity was more or less completely obliterated.

*Iodized injections in ascites.*—Analogy, often a sure guide and always necessary, easily led to the substitution of iodine in intra-peritoneal injections, in place of alcohol as used by Bretonneau, in 1820, the danger of which is too manifest. MM. Dieulafoy and Leriche, in 1847, introduced this happy modification, and have published very detailed accounts show-

ing that in ascites, apparently dependent on simple chronic peritonitis, iodized injections may produce a rapid and complete cure. M. Leriche advises that only one injection be made after the peritoneum has been emptied. The proportions are as follows:

Tincture of iodine.....	30 grammes.
Iodide of potassium.....	4 “
Distilled water.....	250 “

These first successes soon aroused imitation, and cases were multiplied. MM. Boinet, Oré of Bordeaux, and Paul Dard, a pupil of Tessier, of Lyons, have published important papers upon their own practical results, in various scientific collections.

From the considerable number of observations contained in these accounts, there results a fact which has been rather neglected, but which demands more ample verification: the fact that injections of iodine into the peritoneum constitute a treatment which is not only efficient, but seems almost harmless, when executed under good conditions and in accordance with certain rules.

Experience has established certain indications or contra-indications which must be attended to. Thus, injections of iodine are not only useless, but dangerous, when ascites is a symptom of an organic affection of the heart, liver, spleen, kidneys, etc.

It should be reserved for certain rather rare cases in which the ascites is due to chronic peritonitis or a simple secretory irritation of the peritoneal membrane, either idiopathic, or consecutive to menstrual disorders, or a neighboring phlegmasia, as enteritis; or, where the ascites is consecutive to an alteration of the blood, a cachectic state. Let us add that, even in these cases, the injection of iodine should never be used except after all the usual remedies fail.

If the ascites is very voluminous, a previous puncture should be made to lessen the extent of peritoneal surface and the extent of inflammation. It is recommended not to empty the cavity wholly, but to leave in it one or two quarts of serum, in order to diffuse the tincture equally and prevent its coming in direct contact with the irritant liquid, which might provoke a fatal peritonitis.

The entire dose of fluid injected ought not to exceed 250 grammes (3 viii.). The injection must not be made in one push, but insinuated gradually, while the assistants gently knead the belly so as to assist the mixture of the remedy with serum, and insure its penetration to the remoter parts.

*Injection of iodine into the pleural cavity.*—We have performed this in certain cases of collection of pus in the pleura, when, after repeated punctures, the pus tended to reproduce itself continually; we have several times succeeded in effecting a cure, when the complication with tubercle was absent. (*Bull. de la Soc. des hôpitaux*, septembre, 1854.)



Others, including MM. Legroux, Boinet, Aran, etc., have repeated these experiments, and the successful cases are now so numerous and well attested that the accusation of rashness must be withdrawn. M. Aran, emboldened by the success obtained in hydrothorax and hydropneumothorax, has ventured to introduce iodized injections into the pericardium, and his attempt has succeeded.

*Injection of iodine in spina bifida.*—Debout, the former editor of the *Bulletin de thérapeutique*, concluded a report made to the Société de chirurgie, in 1860, in the following words: "Of all known treatments of this vice of conformation, that by injection of iodine is the most efficacious and the least dangerous." In the same year, Dr. Coates, of Salisbury, used iodine injections for a child of three months, affected with spina bifida. He drew out by the trocar 8 grammes of transparent fluid, and injected the same quantity (3 ii.) of a 1½ per cent. solution of iodine. On the next day the child had convulsions of the hands and feet, but the cure was speedy and complete at the end of two months (*The Lancet*, March 3, 1866).

Similar success has been obtained by M. Sézerie, a physician at Saint-Barthélemy (Lot-et-Garonne) (*Acad. de médecine*, 17 sept., 1861), by M. Caradec, of the hospital at Brest (*Union médicale*, 1867, Nos. 26 and 30), and M. Roux (*Bulletin de thérapeutique*, 1869, I., 27).

*Ovarian dropsy.*—Thompson ("Elements of Materia Medica and Therapeutics") gave large doses of iodine (180 drops daily, taken internally), and cured, as he says, three women in five. Some other cases have since been reported, of cure of ovarian cysts by the internal use of iodine combined with frictions upon the tumor. These results, though rare and exceptional, are sufficient to lead practitioners to attend to this practice instead of prematurely using puncture and injections, or ovariectomy.

To Boinet we certainly are the most indebted for this radical treatment of ovarian dropsy. The debates which this grave question excited some years ago are well known; we shall not speak of them, but will simply note the general conditions under which the treatment may legitimately be undertaken. Thus, in cases where the cyst is unilocular, or when it is multilocular and contains only serous or sero-purulent fluid; and in particular, when it has no organic complication, whatever the size of the tumor may be, puncture followed by injection of iodine may offer chances of success. Some observations quoted by Boinet and others assure us of the reality of a more or less complete cure. The iodized injections act here by a double mechanism, either by determining adhesive inflammation (which is much contested) or by exercising a quite special modification upon the secreting surface and the secreted product. Whatever be the nature of this action, observation shows that the effused liquid, be it serous or purulent, tends to improve in character daily, and to lessen in amount until completely dried up. At the same time the cyst shrinks, and at last forms merely a cellular mass without a cavity, a sort of stump, almost inert. These are the most favorable cases—and quite exceptional ones.

It is shown by experience that this method fails almost wholly, and is not without danger, when employed for multilocular cysts, with very hard and thick walls and considerable cavities, especially if the liquid is very viscous or bloody. It is then prudent to avoid it.

An infinity of conditions are required in order to obtain these good results; and a very special *modus operandi* must be followed. We cannot do better than to refer the reader to the *mémoire* of M. Boinet in the *Bulletin de thérapeutique*, août, 1852, and his complete treatise entitled "Iodothérapie," in which these conditions, precautions and methods are fully stated—in short, everything which, after a correct diagnosis, is adapted to insure success (2d edition, 1865).

We must add that, in this very delicate question, great attention must be paid in future to the valuable statements presented at the late academic discussion. While on the one hand this discussion has given the victory to the side of iodine injections, by showing that under favorable conditions the operation is nearly free from danger, and usually followed by a temporary or permanent cure, on the other hand, it will result in making certain contra-indications better known and more definite, and will have the very good effect of checking physicians in that reckless course which has doubtless proved fatal to more than one patient.

*Congestive abscess.*—One of the most important uses of the injection with iodine is its application in the radical cure of congestive abscess. This is due to M. Boinet, who in 1850 reported to the *Société de chirurgie* several cures by injection into the purulent cavity combined with the use of iodized preparations internally. An interesting observation of this sort was published in the *Union médicale* for September, 1853, by Dr. Foucault of Nanterre; the case was one of congestive abscess with fistulæ, of eight months' date, which was cured in two months by iodized injections and the internal use of preparations of iodine.

The method has since been employed by a great number of physicians; we have obtained the best results from it.

*Abscess with separation of skin; fistula in ano.*—Boinet has certainly done the most to popularize the various local uses of iodine. In his hands, injections into the great closed cavities left by abscesses, with separation of skin, became a powerful remedy.

He subsequently extended this method to fistula in ano, and in a paper read in 1853 before the Academy of Sciences, he presented observations which go to show that all varieties may be thus cured, the blind or incomplete, the complete, deep fistulas with burrows and separation of the intestine and fistulas in tuberculous patients; he especially likes this treatment in those sorts of fistula in which incision would be ineffectual or dangerous, for example those which go deep, or depend on caries or other affection of the ischium, coccyx, sacrum, etc.

If these results are confirmed, as certain successful trials since made by others permit us to hope, the method would be preferable to that by incision as causing less danger and inconvenience; it does not prevent



patients from attending to business, and it spares them painful dressings. If the treatment fails, it never aggravates the ailment; hence it may fitly be tried before the knife.

*Injections into the hernial sac.*—To conclude what we had to say about injections into closed cavities, we will add that some physicians, including M. Jobert, have attempted a radical cure of hernia by injecting tincture of iodine into the interior of the sac, and that quite a number of successful attempts have been obtained.

*Painting with iodine.*—If iodine is so useful in the form of injections into closed cavities, it is not less valuable when put on as paint, on the outer skin, or on certain accessible parts of the internal integument.

Painting with tincture of iodine upon the skin is constantly employed as a revulsive, or as a means for producing absorption of the drug, and resolution of subjacent inflammations. The chest is thus painted in subacute affections, as slight pleurisy, or pleurodynia, partial phthisis, circumscribed lobular pneumonia without too active inflammatory reaction.

In these cases the revulsive may well supplant blisters, of which it has the advantages without the defects; it is especially adapted to women with delicate skins, and children, and in general to nervous subjects who would be too much irritated by cantharides.

Painting with the tincture is often indicated at a certain stage of profuse pleuritic effusion, chronic or acute, when a quantity of fluid remains, upon which blisters cease to act, and when the resorbent activity needs to receive a fresh impulse after a period of arrest. This is what may be often seen in effusion of latent type, especially in connection with a tuberculous diathesis.

The same application may be usefully made to the abdominal walls in certain affections of subacute and chronic form, particularly congestion of the abdominal viscera; we have repeatedly obtained very great benefit in engorgement of the mesenteric glands in children.

Painting with tincture of iodine is often used in affections of the joints, as at the close of acute rheumatism when the last remains of synovial effusion disappear slowly; more often in chronic arthritis and incipient white swelling; also in hydarthrosis and hygroma. But in the last named cases, the action of the tincture is usually too superficial, and in general, insufficient; it must be replaced by a more energetic agent, that is, the caustic solution of iodine.

In summary, we may say that there is perhaps no part of the skin to which this topical application is not suited, when a phlegmasia or inflammatory engorgement is located just beneath, or in its neighborhood, and demands a resolvent treatment.

Following the example of the Belgian physicians, we are accustomed in various ophthalmias, especially ulcerative or granular corneitis, to apply tincture of iodine to the lid or on the forehead and temple of the affected side.

*Diseases of the skin.*—The preparations of iodine, particularly the



tincture, have the remarkable power, when applied to the inflamed skin, of driving away the inflammation and its local symptoms. Thus we often succeed in aborting erysipelas, in resolving or improving adenitis or angio-leucitis, which threaten to spread, and even to arrest the evolution of the pustules of small-pox in certain regions, as the face. Tincture of iodine may thus be considered an excellent antiphlogistic, nearly analogous to nitrate of silver.

*Ophthalmia; disease of the lachrymal passages.*—Iodine has been used here, not as a simple counter-irritant, but by virtue of its being eliminated through the tears. M. de Beaufort has taken advantage of this fact to treat chronic affections of the lachrymal passages by the internal use of iodide of potassium in the dose of 0·25 to one gramme (gr. 4—15). A speedy improvement has followed where the tears contained iodine (*Bulletin de therap.*, 1868, 1, 78). We will mention also the good effect of iodized collyria in removing maculæ of the cornea (Castorani: *Bullet. de therap.*, 1868, 1, p. 90).

*Affections of the mucous membranes.*—In spite of assertions to the contrary, the contact of tincture of iodine with the mucous membrane is not at all painful, unless some point of solution of continuity exists, or the membrane is stripped of its epithelium. Boinet has shown that the pharyngeal and buccal mucous membrane may be painted almost without the patient's knowledge; or that of the tonsils, the neck of the uterus, the vagina, etc.; on the condition that the iodine does not touch the orifices of the mucous cavities at the point of transition, where the tissue is infinitely more fine and sensitive, and pain is produced, as acute as when the tincture is put on skin deprived of its epidermis, or a recent wound. Boinet therefore expressly directs that nothing but the mucous membrane be touched.

He also says with much reason that if several coats are laid on the same place desquamation occurs, as it does in the skin, and that subsequent applications will certainly cause pain.

Whatever may be the nature of an affection of the mucous membrane of the mouth or the pharynx, whether specific or not, there is none which has not been advantageously treated with iodized applications. Whether in the form of gargles, washes, or painting with a brush, tincture of iodine has done signal service in simple or gangrenous stomatitis, pultaceous, croupous or gangrenous diphtheria, and granular pharyngeal angina, which is always so obstinate. We may say the same in relation to the various ulcerative, purulent, gangrenous, and syphilitic affections, to hospital gangrene, and, in general, all septic affections.

M. Boinet, who has done more than any one to further the use of these topical applications in the greater part of the inflammations of the mucous membrane, constantly derives the greatest advantage from their use in granulations and ulcerations of the neck of the uterus, and praises them especially in acute or chronic, simple or virulent vaginitis. In this case he paints the whole vulvo-uterine canal from the neck of the womb to the



introitus vaginæ with pure tincture of iodine. One application is usually sufficient. As a measure of precaution, in the case of severe blennorrhagia, he carefully paints the labia majora and minora and their folds; and ends by making an injection into the anterior part of the urethra with a mixture of equal parts of tincture of iodine and water, taking care to prevent its entrance into the bladder. This treatment seems to him preferable to cauterization with nitrate of silver, both as being much less painful, and as much more prompt, easy, and efficacious (*Union médicale*, septembre, 1853).

When the ulcerated surface of the neck of the womb is fungous, and bleeds at the least touch, when the entire os tincæ and part of the canal of the neck are affected, the neck and even the body are seen enlarged and engorged. In this condition cauterizations with nitrate of silver are no longer sufficient, and tincture of iodine is necessary (Gallard: *Bulletin de thérapeutique*, 30 juillet, 1865).

In our opinion there is no such resolvent in uterine and peri-uterine engorgement.

*Chronic dysentery*.—Dr. Delioux (*Union médicale*, 1853,) used iodine in rectal injections to relieve chronic dysentery. By thus directly modifying the surface of the mucous membrane, he has obtained remarkable results. His injections contain 10—30 grammes (3 iiss.—3 i.) of tincture, 1—2 grammes (gr. 15—30) of iodide of potassium to render it soluble, and 200—250 grammes of water (3 vi.—viii.). The affection was cured or much relieved in 10 of the 12 cases reported in his paper; in two cases he failed, but without aggravating the trouble. He states that these injections usually produce only slight colics, easily quieted by the injection of laudanum-water if necessary. He remarks the ease with which iodine might be introduced into the system through the rectum.

We see that iodine has been of the greatest use in a great many diseases of the serous cavities, the external and internal integument. This field of usefulness constitutes one of the most precious conquests of therapeutics. And yet, great and rapid as has been this extension of its powers, we can easily see that new applications remain to be made, and, without doubt, more than one useful result to be gained.

Owing to its remarkable antiseptic and resolvent powers, iodine may find its application wherever there is an ill-conditioned ulcer to clear up, or a vicious secreting surface to modify, or a chronic refractory phlegmasia to resolve. Whatever be the seat of the lesion, whether the surface of the skin or the most remote part of the mucous membrane, or the depths of a serous, synovial, or other cavity, we are authorized to expect everything from iodine, if its topical action be never so little available.

Thus, as experience shows, the materia medica has scarcely an external agent which is at once more efficient and more harmless than iodine. For this reason we do not hesitate in placing it by the side of nitrate of silver, as one of the most precious agents in substitutive medicine.

*Syphilis*.—The powerful resolvent action of iodine, its influence on



nutrition, led to the hope that it might be made useful in constitutional syphilis. For some years iodide of mercury had been used for this purpose, and is found to be of most value in the chronic forms of syphilis. Was the success of the new remedy attributable to the mercury, the iodine, or to the combination of both? Wallace, of Dublin, has touched this question, and shows that iodine is as useful as mercury in the treatment of constitutional syphilis (*Jour. des connais. méd.-chir.*, t. IV., p. 157). Of 142 patients treated, 6 had iritis, 6 engorgement of the testicle, 10 various diseases of the bones and the joints, 97 cutaneous syphilides, 20 lesions of the mucous membrane of the mouth, nose, and throat; finally, iodine was given to three pregnant women to prevent infection of the foetus. The preparation used is the *mistura hydriodatis potassæ*, containing 8 grammes (3 ii.) of iodide to 250 grammes (8 viii.) of distilled water. Adults take a tablespoonful of this mixture four times a day, making 60 grammes (2 ii.) or 2 grammes (gr. 30) of the iodide.

We were the first to try Wallace's method, in 1835, at Paris, and proved its good effects. But M. Ricord, at the head of a venereal hospital, made the trial on a larger scale, and, as a result, he placed iodide of potassium in the same rank as mercury, as an antisypilitic. He made the most use of it in what he calls the tertiary accidents. He places the symptoms which yield to iodide of potassium in the following order: deep tubercles of the skin and mucous membrane; tubercles of the cellular tissue, commonly called gummous tumors; periostosis, caries, exostosis, osteocopic pains, etc.—The doses which he uses are far larger than those of Wallace; he begins with one gramme per day in a draught (gr. 15) and increases to 4 grammes (3 i.) without injurious effects. Bullock has published facts which confirm the statements of Wallace, Ricord, and ourselves (*France méd.*, févr., 1839).

This is a proper place to compare the relative power of mercury and iodine over the symptoms of constitutional syphilis.

Ricord considers mercury the true specific in secondary symptoms, and iodide of potassium as of no real value, save in tertiary symptoms.

This view, while correct in general, becomes inexact when stated absolutely.

Surely mercury does not retain in tertiary symptoms the efficacy which it unquestionably possesses in the secondary. Yet, the most positive facts attest that even then, it is not only not powerless, but even sometimes superior to iodine.

Many physicians have used it with full success, as we have done, not only in certain periostoses which form the transition from the second to the third stage, but even in old exostoses, and other phenomena which are evidently tertiary. And conversely, iodine, though generally more effective in the tertiary accidents, is inferior to mercury in certain ulcerations of the pharynx, and some other manifestations of secondary syphilis.

The treatment of visceral syphilis is not so well defined as that of the



secondary and tertiary symptoms. Iodide of potassium is usually first employed, and sometimes cures. Oppolzer, of Vienna (*Schmidt's Jahrbücher*, 1866, 4), and Leudet, of Rouen, have found it very useful in hepatic syphilis; Rollet ("Traité des maladies vénériennes," 1866), in pulmonary syphilis; and Gros and Lancereaux ("Des affections nerveuses syphilitiques," 1861), as well as Zambaco (*Ib.*, 1862), in nervous syphilitic affections. Nevertheless, when improvement does not occur promptly, and the chief affection is cerebral, we recur to mercury.

Before Wallace, and before iodine had been used in syphilis, Girtanner gave burnt sponge for venereal ulcers of the throat. In 1821, Martini, of Lübeck, substituted iodine for burnt sponge in the treatment of chancres of the pharynx, following Coindet, who had made the same substitution in the case of goitre. He has since often given iodine and iodide of potassium in these grave forms of syphilis, and has been pleased with the results (*Journ. des connais. méd.-chir.*, t. I., p. 90). Dr. Henri Gouraud informs us that he has used it with advantage in chronic anginae not connected with syphilis. We have several times obtained results with it, under like circumstances, which we had failed to secure by other treatment.

While it is incontestable that iodide of potassium renders as important services in constitutional syphilis as mercury, we cannot deny that the union of the two has immense value. Experience has pronounced to that effect. The protiodide of mercury, used on a large scale by Biett, and subsequently by all physicians; the double iodide of mercury and potassium recommended by Pueche (*Bull. therap.*, mars, 1839), hold a very high rank in the treatment of venereal disease. They are given in pills, in the dose of 1—10 centigrammes (gr. 0.15—1.5), combined with a little opium to mitigate their irritating qualities.

*Amenorrhœa.*—The increase which occurs in the menstrual discharge during the administration of iodine, for whatever reason given, induced Brera to try the remedy in amenorrhœa. The facts reported by him in the "Saggio Clinico," *Arch. gén de méd.*, t. II., p. 439 et seqq., are not very conclusive, nor are those of Coindet and Sablairolles. We have tried the remedy in amenorrhœa, and have obtained some results like those of Brera (*Journ. des connaiss. méd.-chir.*, t. I., p. 74). But after some years of experience, we have come to the following general conclusions:

In chlorotic girls, iodine produces no result unless iron has previously been used; but when the blood is restored, iodine plainly increases the flow, and makes it appear sooner than if left to nature. In women of high complexion, with scanty and painful menstruation, iodine increases the flow of blood, but increases at the same time the pain and sometimes causes metritis. It is really useful in women of good color, with scanty but not painful menses. In amenorrhœa proper, iodine must be used a long time; 25 or 30 drops of tincture being given every day, or at least one tablespoonful of Wallace's mixture of hydriodate of potassa, for two or three months.

M. Boinet has noted a curious fact relative to the emmenagogue property of iodine: when he has painted it upon the neck of the womb and the vagina, he has almost uniformly provoked the menstrual flow. This led him to touch the cervix and part of the vagina in certain cases of difficult or suppressed menstruation; and he says that he usually brought back the menses by this plan. He draws a very prudent inference; it is always well to abstain from this act in pregnancy.

*Leucorrhœa*.—It is singular that a remedy which so manifestly provokes the menstrual discharge should have been recommended by Brera, Gimelle and Sablairolles, in the treatment of leucorrhœa; but its effect can be explained as little as it can in blennorrhagia. Pierrequin has used iodide of iron with success in this affection (Mérat and de Lens, t. III., p. 635). In blennorrhœa, Ricord praises it highly.

*Gout, rheumatism*.—M. Gendrin speaks highly of the internal and external use of iodine in gout, saying that in the majority of cases it dispels the sharpest acute attack. He uses it in chronic gout, both to resolve nodosities and chalk-stones, and (internally given) to modify the general health. Valentin, of Nancy, had already recommended calcined sponge in gout (*Journ. génér. de méd.*, t. CIV., p. 59).

We may add that iodide of potassium has more than once rendered us services in atonic gout which we could have obtained from no other drug.

Dr. Aubrun has used iodide of potassium with advantage in acute or subacute articular rheumatism, especially in cases where the patient's weakness forbade bleeding (*Gaz. méd.*, 1843).

Dr. Izarié published in the *Union médicale* (April, 1852) some facts tending to show the value of the same remedy in high doses (4—8 grammes, 3 i.—ij.), for sciatica. The recovery was so rapid that it could hardly be attributed to chance.

Some years ago we had an excessively nervous patient, affected with one of the most painful and obstinate sciaticas, which, after resisting various treatment, especially large blisters and morphia, yielded rapidly to iodide of potassium in rather large doses.

These rheumatic sciaticas, cured by iodide of potassium, naturally associate themselves with the sciatic and other neuralgias which are successfully treated with the same remedy. Dr. Gérard, of Lyons, has reported several instances of the last sort in the *Union médicale*, mai, 1852.

We would remark, that while iodide of potassium may have been useful in certain rheumatic neuralgias, its efficacy is still better established in those of syphilitic origin. Thus, when we meet with certain rebellious neuralgias, with nightly exacerbations, we must not forget to examine carefully whether some connection with constitutional syphilis is traceable, that we may immediately resort to the specific treatment. We will add, that even if in doubt, there is no objection to using a remedy which is suitable to more than one morbid condition.

*Gravel*.—After rheumatism and gout, we must mention gravel as sus-



ceptible of benefit from the preparations of iodine. We know that some physicians, including M. Henry de Saint-Arnoult, have observed old cases of gravel with severe kidney symptoms, in which a prolonged use of the iodide in small doses gave the happiest results. It is surely possible that iodide of potassium, by its special properties, has a direct action on the morbid secretion which characterizes gravel, but perhaps the chief cause of its efficiency depends on the influence of the medicine on the arthritic diathesis, of which gravel is often a mode of manifestation.

*Spasmodic Asthma.*—Some physicians in England and France have recommended iodide of potassium in the treatment of spasmodic asthma. In France, M. Aubrée, a physician and druggist at Bury (Charente), has earnestly advised its use. He makes an elixir with decoction of polygala, syrup of opium and iodide of potassium, and obtains very good results by insisting on protracted treatment. In our own experience we have found its efficacy truly remarkable in several cases. In what way does it act? Is it by its anti-arthritic property, as we just said in regard to gravel, or by a quite special action peculiar to asthma spasmodicum? This is a question which we cannot decide, but the fact is very positive (Trousseau: "Clinique médicale," 3d ed., t. II., p. 476).

*Aneurism of the aorta.*—Dr. Chuckerbutty, a physician at Calcutta, has published two observations in which iodide of potassium, in the dose of 0.6 grammes daily, greatly relieved patients suffering from aneurism of the aorta (*Bull. de thérap.*, 1862, t. LXIII.)

*Pulmonary Phthisis.*—The use of iodine, by inhalation, is not quite new. Proposed in 1828 by Dr. Berton, for chronic bronchitis and pulmonary phthisis, it was tried at the Children's Hospital, by Baudelocque, who thought iodine vapor more hurtful than beneficial to the phthisical; and since then nothing more has been heard of it in France.

But in England, the method was taken up by Murray and L. Scudamore, who said they had obtained good results from it, while at the same time Pereira stated that he tried iodized inhalations in the treatment of pulmonary phthisis without finding any marked improvement.

The remedy had fallen into general neglect, when Piorry called attention to the use of vapors of iodine and to the internal administration of iodine and the iodides in this disease. Dr. Chartroule, following Piorry's indications, has paid special attention to this branch of therapeutics, and especially to the use of iodine in the form of vapors. He causes the patient to inhale the vapor either from cigarettes or from a special apparatus, which is very like that used by Cottureau for his inhalations of chlorine. M. Danger has since presented to the Académie des sciences, an apparatus of the same sort, very simple in mechanism, by the aid of which the patient may inspire pure, dry, warm air charged with iodine in the state of vapor, which in this state of purity penetrates to the furthest bronchial ramifications (August, 1853).

Others, following Piorry, simply place the patient in an iodized atmosphere by keeping by his bedside saucers which contain a certain amount

of this volatile substance. A weak tincture of iodine is generally placed on the thorax, in addition to the above, and iodine and the iodides are also taken internally.

Whether this remedy, under these various forms, acts as a direct modifier of the bronchi or as a reconstituent of the entire system, it is certain, on the one hand, that it has a favorable influence upon lymphatism and the strumous diathesis, and that, on the other hand, in a considerable number of cases it has rendered important services to tuberculous patients, either by improving that concomitant bronchorrhœa which exhausts most phthisical persons, or by reanimating the appetite and the strength of those enervated and cachectic patients who fill our hospitals.

But to suppose that iodine, in vapor or otherwise, has accomplished firm and complete cures, or that the process of tuberculization has been arrested indefinitely, is to make a claim which seems to us unsupported by present experience.

*Laryngitis, bronchitis, catarrh.*—While the virtue of iodine is still doubtful in phthisis, it is not so in bronchorrhœa or catarrh of the mucous membrane of the bronchi, where it is plainly useful, as it is in catarrh of the urethra, the vagina and the uterus. We confidently recommend inhalations of iodine, in various forms, in the treatment of certain cases of laryngitis, and bronchitis in a chronic state, in which we have many times seen their efficacy.

*Typhoid or putrid fever.*—We have seen that iodine possesses the most remarkable antiseptic powers. It was therefore quite natural to seek to utilize these properties in the various diseases marked by symptoms of putridity or septic poisoning of the blood. Boinet and Aran had already made some trials of iodized preparations in typhoid fever, with quite good success; but their results had not become much known when Dr. Magonty formulated the method more precisely. He gives to adults three or four spoonfuls a day of a solution containing 5 centigrammes (gr. 0·75) of iodine, 2 grammes (gr. 30) of iodide of potassium, and 240 grammes (nearly  $\frac{7}{8}$  viii.) of distilled water. At the same time he ordered two injections per diem, each containing 5 centigrammes of iodine, 50 centigrammes (gr. 7·5) of iodide, and 125 grammes ( $\frac{5}{8}$  iv.) of distilled water. There is only one objection to the results; they were altogether too good, since of 21 patients, 21 are claimed as cured.

M. Régis, following the same plan, calmed the ataxic symptoms in an epidemic of typhoid fever, by giving every day 4 drops of tincture of iodine in a soothing mixture (*Gazette hebdomadaire*, 1865).

In spite of this success, we are certainly indisposed to propose the iodine method as a general plan of treatment in typhoid fever. But on the other hand, as we see no reason to proscribe it absolutely, it seems to us rational to use it in certain forms, where putridity or septicæmia prevails from the outset.

For the same reason, we should be inclined to appeal to this remedy in another disease, very different in its septic nature and its severity; we



refer to puerperal fever, especially in its epidemic form. Some cases of cure under this treatment have been cited; these, though inconclusive, and the known impotence of medicine in this terrible malady, form a sufficient ground for making further trials of iodine.

*Tubercular meningitis, acute and chronic hydrocephalus.*—More than twenty years ago, Roeser recommended this remedy in acute hydrocephalus; since when, following his example, a certain number of English physicians of great authority, as Copland, Evanson, Wood, John Coldstream, etc., have pronounced in favor of this treatment. More recently, M. Laffore, of Agen, and M. Scœpf Merceï, of Pesth, have affirmed its value with a confidence bordering on enthusiasm. M. Laffore, in a paper presented to the Académie de médecine, at Paris, stated that iodide of potassium in the dose of 3 grammes (gr. 45) had succeeded in seven cases of tubercular meningitis, several of which presented the symptoms of the third period. But the experiments made by the same physician at the children's hospital, at Paris, had no such favorable results.

Having been repeatedly invited by physicians who had confidence in the remedy, and being in despair of the disease, almost invariably fatal as it is, we have many times given iodide of potassium in the cerebral fever of children, especially in tubercular meningitis, both in and out of hospitals. But we never obtained, we will not say success, but even an improvement sufficiently marked to encourage our attempts. We know that other physicians claim to have been more successful, but it may be of use to observe that there are certain causes of error or illusion which it is not always easy to avoid.

*Chronic glanders.*—Although it be not allowable to identify chronic glanders in the horse with tubercular phthisis in man, the usual incurable nature of glanders gives some value to the case reported by Thompson, and ought to induce physicians and veterinarians to employ iodine in hopeless cases. His case is as follows:

A glandered horse took 150 drops of strong tincture of iodine three or four times a day in water. This was continued regularly for six weeks, during which time not less than 450 drops were given daily, and often more than 500 or 600. The benefits of this solution became evident in a few days, and at the end of seven weeks the animal was almost entirely cured. Four years later, he had had no relapse.—Was the glanders well established? According to Dr. Thompson, the symptoms were very evident (*Gaz. méd.*, 1847, No. 42).

*Albuminuria.*—Dr. Monfeullard ("Thèse de Paris," 1869) has published very remarkable results obtained with iodine. The first successful cases were treated by Dr. Baudon, of Mouy (Oise). The latter at first prescribed iodide of iron in the dose of 0.2—0.4 grammes (grs. 3—6), and afterwards iodide of potassium in doses increasing from 2 to 20 grammes (grs. 30—300) per day. But in these enormous quantities, iodide of potassium was ill borne and had but little effect. Dr. Bourdon, at the Charité, obtained the same results much more simply with 12 drops of tincture of iodine per

## ALTERATIVES.

day, given after the manner of Guéneau de Mussy in a starchy poultice such as rice-water. Finally, Dr. Monfeullard has used iodide of calcium in the dose of 1—3 grammes (gr. 15—45). The two latter preparations, iodide of starch and iodide of calcium, caused a much more rapid disappearance of albumin from the urine. Of the 13 patients whose cases are reported by Dr. Monfeullard, 12 were cured and the other greatly improved. These results are very encouraging.

*Mercurial salivation.*—Dr. Knod, a few years ago, communicated to Hufeland's journal the discovery which he had made of the property possessed by iodine, of arresting salivation. Kluge employed this method with the greatest success in 17 patients at the Charité hospital in Berlin. The pain and swelling of the glands and the salivation ceased after five or six days, and even syphilitic ulcers rapidly improved. The dose was 10 centigrammes (gr.  $1\frac{1}{2}$ ) per day, and was raised by degrees to 20. The formula used was the following:

R. Iodine..... 25 centigrammes (grs. 3·8).

Dissolve in

Alcohol..... 8 grammes (3 ii.).

And add

Cinnamon-water... 80 grammes (3 xx.).

Syrup of sugar..... 16 grammes (3 iv.).

Give daily, at first 4 half-spoonfuls, afterwards 4 entire spoonfuls of the mixture (Hufeland: "Journ.," ap., 1833, and *Journ. des connoiss. méd.-chir.*, t. I., p. 89).

The salivation of pregnancy is notoriously obstinate in the majority of cases. We have read with interest an observation published by Dr. Le-maëstre, in which a salivation, so abundant as to threaten to exhaust the patient, and rebellious to all other remedies, was quite rapidly cured by iodide of potassium given in the form of pastilles. Four or five of these were given daily, to be allowed to dissolve in the mouth, and the saliva to be swallowed.

*Injurious effects of mercury and lead.*—MM. Natalis Guillot and Melsens have found that iodide of potassium causes mercurial tremor to cease, and moderates or causes to disappear the severe affections often observed in lead-workers. They gradually raise the dose of iodide of potassium to 4 or even 6 grammes (3 i.—iss.) per diem.

In a more recent paper (*Journ. de chimie médicale*, 1849, p. 136), M. Melsens has proposed iodide of potassium in the treatment of chronic poisoning by the compounds of lead and mercury. Under the influence of the remedy these compounds are rapidly eliminated by the urine. It must be given in small doses, since a large quantity of lead or mercury, set free at once in a soluble form, might cause acute poisoning.

*Loosening of the teeth.*—There is no more frequent cause of the loosening of one or several teeth than inflammation of the alveolar membrane. Sometimes the origin of this is in the tooth itself, or the gums; at other



times it originates from the periosteal covering of the alveolus, and, reaching the root of the tooth and the gum, causes much pain and swelling; the tumefaction of the tissues pushes the root of the tooth out of the alveolus, and a tooth thus loosened not rarely falls out, though it may have no trace of alteration.

This affection is usually accompanied by an acute pain and a discharge of pus between the gum and the inflamed periosteum. The treatment is often confined to the application of a few leeches to the painful part, and in severe cases to deep incisions in the gums and the inflamed periosteum. "One of these patients," says Graves, "was treated by this method; and, though he was in the hands of a skilled surgeon and an eminent dentist, he lost successively a left canine and an upper molar tooth. The extraction of these gave him momentary relief, but in a few days the pain returned as bad as ever, and no remedy was offered except to pull out all his teeth as fast as they became loose. After various attempts he came to me, when, recollecting that I had successfully treated him the year before with hydriodate of potassa for a periostitic affection of the sternum and the ribs, I directed him to take 8 grains three times a day; he began to improve directly, the pain and inflammation disappeared at once, and in ten days his teeth were perfectly solid. The periostitis was rheumatic in its nature; his constitution was healthy, and he was only forty-four years old."

But we must add that in this severe gingivitis with loosening of the teeth the internal use of iodine is usually insufficient, and must be reinforced by topical treatment. In this case Marchal, of Calvi, orders the aqueous solution of Lugol, in preference to the tincture. The topical use of iodine is doubly valuable here, for, in addition to its essential and curative action upon the affected part, it acts also as an antiseptic, correcting the bad odor of the mouth.

*Coryza*.—In chronic coryza, and especially in ozæna, we must recommend iodine. It is used in watery solution or tincture, applied within the nasal fossæ by a pencil or by injection. For the same purpose, from 8 to 12 pinches of the following powder, prepared by Dr. Sobrier, may be taken daily with advantage: iodide of sulphur, 30 centig. (gr.  $4\frac{1}{2}$ ); subnitrate of bismuth, 4 grammes (3 i.); powdered licorice, 8 grammes (3 ii.).

*Nervous diseases*.—What are we to say of the experiments of M. Manson in the treatment of chorea and various paralyses? The author's facts are not wholly without interest, but are far from conclusive. We ought, however, to mention that small doses of tincture of iodine have been proposed as one of the best remedies for the vomiting of pregnancy.

We close with a curious statement made by M. Donné in 1826, namely, that tincture of iodine is the best remedy in poisoning by morphia, strychnia and the other vegetable alkaloids. In this case there are formed compounds which, according to Donné, have no injurious action. But these facts need confirmation.

*Exophthalmic goître.*—M. Gueneau de Mussy relates four cases of prompt and almost unexpected relief by the use of iodide of starch, in hypertrophic goître. He gives from 3 to 6 drops of tincture of iodine, three times a day, to be poured into a little glass of rice-water at the moment it is to be swallowed.

The first case is one of a gardener affected with a three-lobed hypertrophic goître passing under the sterno-mastoid muscles and threatening suffocation. By this treatment, the dose never exceeding 18 drops of tincture daily, the patient was cured in two months. The second case is that of the son of the preceding, whose goître was less advanced, and was cured likewise. The third was that of a chambermaid; the cure was equally rapid. The fourth is a case of exophthalmic goître in a patient under M. Gueneau de Mussy at the Hôtel-Dieu; at the end of a fortnight her neck was one centimetre ( $\frac{4}{10}$  of an inch) less in circumference, and in a month, one centimetre and a half, when she left the hospital and was not seen again.

#### IODOFORM.

*Goître.*—In 1843 Bouchardat recommended iodoform as a substitute for tincture of iodine and iodides, and gave it in pastilles and pills. In 1848, Glover, professor of materia medica at the university of Newcastle-on-Tyne, followed his example, curing two women who had goître by internal and external treatment combined. He gave it internally in the dose of 30—45 centigrammes (gr. 4·6—7) a day in 3 or 4 pills, making incision upon the tumor at the same time with a pomade containing iodoform (*Union médicale*, 1858, p. 198).

*Ulcers.*—In 1853 Righini of Novara discovered that iodoform was an excellent application for causing atonic ulcers to heal, and that under its influence wounds which had no tendency to heal were speedily and happily modified. The same results were obtained at Paris by M. Lailier at the hospital Saint-Louis, and by M. Besnier (*Bulletin de thérapeutique*, 1867). M. Féréol cured atonic and varicose ulcers in a very short time by this means (*Société de thérapeutique*, 20 mars, 1868). M. Labrie used it for children to dry up pale sores left by blisters which did not heal (Thèse of M. Decuignières, Paris, 1872).

Similar observations were made by M. Maillard ("Thèse de Paris," 1868), A. Guérin, Nieskowski ("Thèse de Paris," 1871), and M. Petiteau ("Thèse de Paris," 1871); the last particularly emphasizes the success which he has seen under M. Féréol's treatment during the war, in gunshot wounds.

A question here arises: By what process of mechanism does iodoform act on these ulcers? Is it simply because the drug, being in the form of powder, acts as a mechanical absorbent? This is hardly probable, for the same sores when dressed with powder of lycopodium or starch did not change their appearance. Is it because it is composed of crystals, which



act as irritant bodies? To solve the problem M. Lailler dressed a patient's syphilitic sores upon one side with iodoform powder, and upon the other with talc; the result was very different in the two cases. To ascertain whether the action was due to the presence of iodine, M. Lailler dressed some sores with the tincture of iodine and iodide of potassium, and failed to obtain as good results as when iodoform was used. We are, then, reduced to think, with Righini, that its efficacy depends in part upon its relieving the pain of ulcers; that is, its anodyne action ( $\alpha + \delta\delta\acute{\upsilon}\rho\eta$ , pain).

From these results, we can easily credit the prompt improvement in scrofulous ulcers which is reported by MM. Maître, Humbert, Morétin, Jules Simon and Petiteau.

*Cancer.*—The alterant, resolvent and anodyne action of iodoform explains the origin of its use in dressing ulcerated and painful cancers and canceroids. M. Bouchardat recommended it in 1857, and from that time a great many cancerous patients were treated by this remedy. Debout remarked that it produced in women affected with uterine cancer a sensation of calm and comfort (*Bull. de thérapeutique*, 1857); Greenlach of St. Bartholomew's hospital, and Nunn of Middlesex (*Lancet*, 1866) made the same remark, and since then a large number of French physicians, among whom we will name Demarquay (*Bull. de thérapeutique*, 1867, t. I., p. 399), Woelker (*Ibid.*, t. II., p. 493), Lailler, Maillard, Petiteau, Decuignières. These good effects, which we have also obtained, particularly in canceroid of the uterus, have one further advantage: that they have led to the employment of iodoform in painful ulcers which were on the point of being given up, but which were not cancerous since they were cured.

*Fissure of the anus.*—M. Morétin, observing that a suppository of iodoform introduced into the rectum considerably lessened the sensibility, formed the idea of applying it to the treatment of fissure; he was successful; and several successful cases have since been treated by ourselves, and by MM. Lailler (hospital of Lourcine, 1859, and later at Saint-Louis), Féréol, Nieskowski, and Petiteau. It is a remedy to be tried before using forced dilatation, which always succeeds, but is objectionable to patients.

*Visceralgia* (of the rectum, vagina, prostate, bladder, uterus, teeth, etc.).—The anodyne effects obtained by Morétin in the case of the rectum naturally led to a trial of suppositories of iodoform in painful spasmodic affections of the prostate and bladder (Morétin). M. Hillairait has used it to relieve the pain of piles; M. Marotte, in vaginismus; and M. Demarquay, to diminish the meteorism which accompanies uterine affections.—M. Lailler has made a paste of it, to fill the cavities of carious teeth and relieve the pain.

*Soft chancre.*—The daily use of powdered calomel in this affection gave rise to the notion of using powdered iodoform, which has had great success at the hospitals Saint-Louis, of the Midi, and of Lourcine (Lailler, Féréol, Nieskowski, Petiteau, Isard, Fournier, Simonet, Verneuil, Gosselin). But we must not forget that the treatment is hardly practicable,

except in hospitals. In fact, the odor is so penetrating that it impregnates not only the breath and the clothes of the patient, but his whole room, and sometimes the entire house, smell of it very perceptibly. It is impossible to treat a person secretly with such a remedy, and, as the odor is pretty well known, it is very compromising. A patient whom we were treating with iodoform, having the rashness to show himself at a public ball, was soon an object of attention on the part of those near him, and had to retire in haste.

*Syphilis.*—Iodoform seems to have no effect on hard chancre; but the case is different with ulcerous syphilides, and M. Féréol has succeeded very well by powdering them with iodoform, and MM. Petiteau and Isard report similar observations. M. Nieskowski thought he had succeeded quite remarkably in onychia syphilitica; but it is probable that he began to treat it when already in process of cure, as M. Fournier, who made the same trial at the Lourcine Hospital, did not succeed.

Finally, Aran cured mercurial stomatitis with iodoform. But we doubt if chlorate of potassa will be abandoned for iodoform in this affection.

### COD-LIVER OIL.

#### *Therapeutic Action.*

*Rachitis.*—The effect of this remedy in rachitis is so evident that it would deserve a high rank in therapeutics for this alone.

The four cases reported by Schenck are full of interest. A child of two years, rachitic, unable to stand, took half a tablespoonful of the oil morning and evening, and was perfectly cured when he had taken 250 grammes ( $\frac{2}{3}$  viii.). Another could walk at the age of twelve months, but soon after became rachitic, and lost the power of standing; he took, at the age of two, three teaspoonfuls of the oil a day, and was cured after taking 300 grammes ( $\frac{2}{3}$  x.). A third, who was very well during the first year of his life, had all the symptoms of rachitis in the second; he had walked very well, but now had lost the power of standing. He was cured after taking 300 grammes of the oil: a teaspoonful three times a day. The fourth case is still more convincing. A little boy walked alone at the age of one year; his knees soon after swelled, the spine became twisted, and the poor child lost the power of walking. All the remedies had been tried in vain, when Schenck employed cod-liver oil, giving half a tablespoonful morning and night. The child was perfectly cured, excepting a slight deviation of the vertebral column, after taking 520 grammes (nearly  $\frac{2}{3}$  xviii.).

The testimony of Dr. Fehr deserves quoting: "The striking effect of this remedy," says he (Hecker's *Annalen*, July, 1829, p. 346), "is manifested, not only after a change in diet, or the beginning of fine weather, or the commencement of a period of growth, but very often after one or two weeks. The teeth, often black and loose, become clean and firm. Chil-



dren who could not extend their legs, and who uttered loud cries when they were stood upright, begin to stand, and soon to walk, provided they are of a proper age or have previously walked. Their digestion improves, the stomach becomes more supple, especially in the hepatic region. The excessive or deficient appetite ceases with the acidity of the stomach; the ribs, however distorted, resume their natural form; respiration becomes free and easy, the legs become straight, and often the teeth appear promptly, etc."

M. Bretonneau, ignorant of the scientific studies of cod-liver oil which were making in Germany, was led to try it in rachitis in the following way: a Dutch merchant had established himself at Tours, and took Bretonneau for his physician. One of his children became exceedingly rachitic, and when the learned practitioner had tried the usual remedies in vain, the father said that the eldest of his children had had the same complaint, and had been cured in Holland by fish-oil taken as a popular remedy. M. Bretonneau tried the same remedy for his little patient, and with such incredibly rapid success as to astonish him. He tried it for other rachitic children; and while making his experiments, he was pleased to see that his success was corroborated by that of the German writers whom we have just quoted. We might add the testimony of Stapleton (*Annales de la Société de médecine de Gand*), who cured children and adults of rachitis by large doses of cod-liver oil.

Repeating the experiments of Schenck, Fehr, and Bretonneau, we have convinced ourselves that cod-liver oil acts very quickly in rachitic children, and is most serviceable. Having for some time been at the head of a children's hospital, we have given it many times to rachitic patients, and have often obtained a success more speedily than we had hoped.

Sometimes, after four or five days of treatment, the acute pains in all the limbs cease; and the bones, which could be bent, often regain a great part of their solidity in a fortnight.

A woman with osteo-malacia in an extreme degree, who could not move a limb, completely recovered the firmness of her skeleton in two months of treatment; we have often seen her since, and her health has always been perfect.

Until long experience had given us certainty of diagnosis, we confounded rachitis with scrofula, as many physicians do. But while scrofula is so often betrayed by tubercular lesions, rachitis seems to exclude tubercles, at least in so far as that, in our children's hospital, rachitis is rarely complicated with tubercle, which is found in almost all children who die of any chronic disorder.

We used also to confound two very distinct diseases, tubercular mesenteric atrophy and ascites symptomatic of rachitis. It is important to know that in the majority of children affected with rachitis, the liver is hypertrophied, and a serous effusion, often extensive, into the peritoneum occurs; this effusion is absorbed with the greatest facility while the rachitis is getting well; and inexperienced physicians who have diagnosti-



eated *tabes mesenterica* imagine they have cured this dread malady, so rarely recovered from, with cod-liver oil. Let us add before leaving the subject, that *rachitis* is a disease which most commonly begins during the second year of life; while tuberculous mesenteric disease is a rare affection in children at the breast—so rare, in fact, that we have made but one or two autopsies of such cases in several years, at our hospital.

*Scrofula*.—Though cod-liver oil does not possess the incontestable—almost miraculous virtue in *scrofula* which is almost unanimously accorded to it in *rachitis*, it is no longer possible to deny its real influence. But this influence is less marked and less certain in some forms than in others.

It is a singular fact, that in general the strumous affection is usually modified favorably by the oil when it is located in the fibrous and bony tissues, as in certain white swellings, and caries, even when it has produced a cachectic general condition by excessive and protracted suppuration; while in cases where the disease is manifested in the form of chronic engorgements of glands, and especially in adenitis with tubercular degeneration, the action is less certain.

On the other hand, when scrofulous adenitis followed by suppuration has deeply impaired the constitution by very prolonged discharges, cod-liver oil resumes its advantages, and gives the most obvious and happy results. The explanation of this curious fact will be given at the end of this article. It is the same with the dermatoses, ophthalmia, and otitis, when allied to strumous cachexia.

Among the severest of the dermatoses which are cured by cod-liver oil we will place *impetigo*, the malignant *scrofulidæ*, and especially *lupus*. Every one knows of the wonderful cures obtained by MM. Emery, Devergie, Gibert, Bazin, etc., in the latter disease, by means of very large doses of the oil—200 to 300 grammes ( $\frac{3}{4}$  vii.—x., nearly) per day.

Finally, in mesenteric *tabes* with tubercular affection of the mesenteric glands, cod-liver oil counts some successes; but these are more numerous when the abdominal affection, principally characterized by *ascites* or *tympanites*, is dependent on *rachitis*, as is so often observed.

*Phthisis pulmonalis*.—The success which many physicians have claimed in glandular *scrofula* has induced others to try cod-liver oil in a much graver manifestation of the scrofulous diathesis, in pulmonary consumption.

Pereira, of Bordeaux, was the most ardent promoter of this treatment. We would take leave to say, that in the memoir which he read before the Académie des sciences, he reported so large a number of cures, and exalted the power of the oil so much, that his enthusiasm suggested scepticism. We have repeated his experiments, and others have done the same; and while in a certain number of cases we have obtained a notable improvement of symptoms, we must add that in the immense majority, cod-liver oil has failed, as do all remedies, whether empirical or rational, which have ever been tried. The question, however, does not seem to us finally settled, particularly as our principal experience has been with hos-



pital patients, that is, under conditions which were perhaps not the most favorable for a decision.

Since then the experiment has been made on the largest scale; in phthisis, and in many other diseases, the remedy has been almost a matter of course. But the results have been, as one might have expected, entirely contradictory; some being in favor of the curative or beneficial effect of cod-liver oil in phthisis, while others attested a very slight efficacy, or absolute powerlessness. The extreme divergence of opinion which still reigns in regard to this grave question seems to us largely due to a cause which ought to be mentioned: the fact that cod-liver oil has generally been given for pulmonary phthisis in too empirical a manner.

At the beginning of phthisis the oil renders important service when we find tubercles in the first stage in a very limited region of the lung, without active and dominant inflammation, without symptoms of phthisis properly speaking, and everything seems as yet local, except that the general functions begin to be a little languid. It is then necessary to act; for it is probable that emaciation will soon commence, and be followed by hectic; tuberculous pneumonia will soon follow, and the second stage of phthisis may be close at hand.

In this case we advise to begin by giving to the lungs a shock to relieve congestion and produce resolution—by an emetic, 30 grains of ipecac powder and two centigrammes (gr. 0.3) of tartar emetic mixed and made into three equal doses, to be taken very early in the morning, fasting, at intervals of a quarter of an hour. Two days later, cod-liver oil may be commenced; to be taken at the beginning of meals.

The patient must take exercise, for the oil, taken in a state of idleness and seclusion, acts badly, does not fatten, and develops neither the nervous nor the muscular element.

This analeptic should not be taken more than two weeks in a month: otherwise, it fatigues and saturates the digestive tract, acts badly, and destroys its own future career. Its real value must be economized by not wasting it, and by returning to it often. A dessertspoonful before each meal is the smallest dose that can be taken, and two before each meal followed by a mixture of black coffee and wine of bark are a quite sufficient dose.

Cod-liver oil is something more than a fatty substance; it is a substance intermediate between a food and a medicine. It is for this reason that it should be given in the cases of which we now speak. What proves this is the fact that fatty foods act with much less energy than cod-liver oil, however they be taken, and in however large quantities. This places a natural distinction between this truly medicinal oil and the fatty foods.

Cod-liver oil has not only an analeptic, but an unquestionable pectoral virtue; in many phthisical patients it calms the cough quickly and makes breathing stronger and deeper.

When the oil is well borne, the patients grow fat rapidly, but the



other forces, muscular strength and hæmatosis, by no means increase in proportion. The patients feel this, and the dynamometer proves it. The increase, however, of muscular force and hæmatosis, occurs later, even when the use of the oil has been suspended.

The eye of the patient regains lustre; the complexion brightens; he feels muscular force increase, and the dynamometer shows that the muscles are richer and more contractile. A certain rise in the scale of organic life has occurred. A substance assimilable to the tissues has formed fat, which seems to be a minimum of assimilative result, but really contains all that is necessary to rise in the scale of the organic elements. In fact, it is promoted to higher and more noble organic functions; it becomes muscle and nervous cell. It is very probable that these processes are accomplished in the lymphatic and circulatory apparatus.

The efficacy of cod-liver oil depends on conditions which are not enough appreciated. To act well, it must be well burnt. This is doubtless the reason why it succeeds much better in phthisical patients who exercise than in those who cannot leave their room or bed. Those who take it must be made to walk as much as possible in the open air. For this reason we give it much less in the hospital. Patients confined to the bed or room almost always have fever; and the oil is much less successful when fever is present.

Although the remedy is contraindicated by a very marked fever, it is not so when the patient presents only that sub- hectic frequency of pulse with simple febrile exacerbation in the evening, remitting in the morning. Such patients may and ought to go out; and if borne by the digestive organs the oil is useful (Pidoux : " *Etudes générales et pratiques sur la phthisie*," 1873; and " *Traitement comparé de la phthisie*," *Union médicale*, 1869).

For these reasons we incline to the opinion of Dr. Müller of Mühlhausen, to wit: that the properties of cod-liver oil reside neither exclusively in its iodine, nor in its phosphorus, nor its fatty matter, nor its extractive matter, but that it is the entire oil with all its principles that cures; and we cannot say that any vegetable oil, iodized or phosphorized, prepared in the laboratory, can ever wholly replace cod-liver oil.

We shall presently return to this question.

*Chronic rheumatism.*—Though most of those who have examined the therapeutic action of cod-liver oil agree as to its utility in rachitis, scrofula, and even pulmonary phthisis, they are by no means so unanimous upon its value in chronic rheumatism. It is certain that, in France especially, the general view is against its possessing any great value in this case. But the facts reported by Schenck (l. c.) are really interesting. Perhaps the cases he reports are rather diseases of the medulla and the spinal column than true rheumatism. Yet it is curious to see paraplegia of years' duration, and simple or double sciaticas, probably due to an affection of the end of the spinal cord, yield rapidly to the influence of cod-liver oil after the most active treatment had failed. Let us recall that Wesener (*Hufeland's Journal*, May, 1824), Wolkmann (*ibid.* Nov., 1824), Schütte



(*Arch. f. Medizin*, 1824), Reder (l. c.) report many cases which attest the usefulness of this medicine in chronic or scrofulous diseases of the bony system, and in rheumatismal affections.

In a very large number of cases, the rheumatic pains, or what were called such, were aggravated by the first doses, and this circumstance must probably have prejudiced the remedy in the minds of experimenters or physicians.

A great uncertainty still prevails, if not a total disagreement, relative to the therapeutic value of cod-liver oil in chronic rheumatism. Dr. Müller of Mühlhausen, in seeking for the reason why the remedy is so slighted among us, while in Northern Europe its use is so popular and its success so unquestionable, has established a distinction which accounts for this singular difference in results and reputation.

According to Müller, cod-liver oil, far from being proper in all cases of rheumatism, is only applicable to two quite special varieties, viz.:

1. Musculo-fibrous rheumatism, belonging to extreme poverty, and caused by privation, embarrassment, absence of air and light, a constitution originally weak and deteriorated, the scrofulous diathesis, and inheritance. This form, beginning with simple painfulness of the limbs, occupies the back as far as the neck, and stiffens and contracts more or less permanently the muscles of the limbs and trunk, without ever assuming an inflammatory character; is accompanied by œdema only, without redness, and sometimes leads to paralysis.

2. Fibrous rheumatism, due to a prolonged stay in moist, cold places. This variety, beginning with the articulations, presents at first some mobility, and is almost wholly confined to the fibrous tissues; its slow and usually apyretic progress alters nutrition by degrees, and leads to exhaustion without contracture or paralysis.

Cod-liver oil succeeds only in these two forms of rheumatism, and when used with great perseverance. The action must be, as in the diseases previously studied, purely indirect; not attacking the rheumatic diathesis itself, but previously modifying the impaired constitution, improving the nutrition, and, in a word, combating the cachectic state which forms the chief obstacle to cure (*Bulletin de la Soc. méd. pratique*, 1851-52).

If this distinction be just, why need we wonder that cod-liver oil, given under precisely opposite conditions, in inflammatory or sub-inflammatory forms of rheumatism, often increases the pain with the first doses; and that many practitioners, discouraged by these bad results, abandon the remedy absolutely in the treatment of rheumatism?

*The cachectic condition in general.*—If, as we have tried to prove, the cod-liver oil draws almost all its power, even in the best determined affections, from its reconstructive virtues, if it is at once a good food and an excellent tonic, it naturally follows that it must render excellent service in that general state of deterioration which we call the cachectic state.

Here is an important practical question which we find clearly stated in

that excellent treatise from which we have already drawn, and from which we again borrow:

Whatever cause may exist for the cachectic state—whether it be due to insufficient or bad food, absence of light or air, the prolonged influence of damp cold, want of exercise, as in imprisonment in cells, exhaustion produced by all sorts of excess, too rapid growth, difficult dentition, abundant suppuration, chronic catarrh, an old defect in the digestion; whether it be connected with a special morbid diathesis, the syphilitic, scorbutic, cancerous; or with albuminuria, diabetes, etc.—experience shows that in these morbid conditions, so diverse in cause and nature, but all producing one result, deterioration of constitution, languor, perverted or insufficient nutrition, cod-liver oil sometimes produces the most unexpected and permanent cures by its nutritive and stimulant properties.

After all we have said, in spite of the incredible abuse to which the oil is daily subjected, we fear not to conclude that the introduction of cod-liver oil into therapeutics is one of the happiest conquests of our age.

Dr. Anstie has obtained remarkable cures of refractory chorea, paralysis agitans, epilepsy and mercurial tremor, by this remedy (*British Med. Journal*, March, 1863).

*Hemeralopia*.—Dr. Desponts, of Fleurance (Gers), having obtained marked success in hemeralopia, Professor Gosselin was directed to make a report on his work to the Académie de médecine, and became convinced of the efficacy of the treatment in an epidemic which affected several soldiers of the garrison of Paris. When left to itself the attack lasted two or three weeks. Under the influence of the oil the cure was much more rapid, and the soldiers were able to resume day and night service after three days of treatment. M. Gosselin also remarks that this night-blindness is preceded by a sort of premonitory blepharitis, and he thinks that if the latter were treated, the hemeralopia would not make its appearance (Académie de médecine, 15 juillet, 1862). The same success had previously been obtained at Lisbon; and subsequently at Hans, by Dr. Surmay (*Bulletin de thérapeutique*, 1862, I., 427).

#### SUBSTITUTES FOR COD-LIVER OIL.

In Belgium and Germany a few physicians, who were soon followed by a large number, denied to this oil the possession of special properties, and concluded that the substance known in commerce as fish-oil, which is chiefly derived from the cetacea, possesses the same properties as that which is drawn from the liver of the ray or cod. Bretonneau, especially, gave credit to this view; this physician, whose authority in therapeutics is so considerable, prescribed to his patients indifferently whale-oil and cod-liver oil; we have often heard him say that he always obtained the same success. The use of fish-oil is popular in the most northern latitudes. The races of Kamtchatka, Lapland, and Spitzbergen combat the depres-



sion which the absence of solar light produces, by drinking enormous quantities of whale-oil. All along the coast of the Baltic and the North Sea, whale-oil and cod-liver oil were indifferently given by the people to weakly children or sickly adults; and, as we have said, physicians, struck with the results of this empiricism, repeated the experiments and confirmed the results.

Some Belgian physicians have gone further. One of these, Dr. Dubois, substitutes poppy-seed oil, which is edible, for cod-liver oil. He has collected fourteen cases of rachitis, and ten of various strumous diseases, which were submitted by him to the action of poppy-oil; and in several of these cases, especially those of rachitis and scrofulous caries, no better results could have been gained by using cod-liver oil. He gives it to children, at first in the dose of half a tablespoonful or a tablespoonful morning and evening, and increases the dose progressively (*“Annales de la Soc. de méd. d’Anvers”*).

Dr. Pophen recommends, in strumous affections, as glandular induration, scrofulous ulcers, enlargement of bones with or without caries, the use of bacon lightly fried. He gives this on an empty stomach, in the dose of 8 grammes (3 ii.); directly after he eats, in any kind of soup, the drippings which came from the bacon while frying, and an hour later he takes a cup of acorn-coffee with slices of buttered bread.

When the disease is slight, from four to six weeks of this treatment are said to suffice for a cure; when the symptoms are very severe, the medication should be continued for nearly three months.

Well-smoked raw ham and good, non-fermented beer, are among the very best auxiliaries in diet (*Wochenschrift f. d. gesammte Heilk.*, 1841).

When at the head of a large hospital for children, we made comparative trials of butter eaten on bread and ordinary cod-liver oil. When the quantity of butter eaten was large (60—150 grammes,  $\frac{7}{8}$  ii.—v. per day), the rachitic children rapidly improved; almost as fast as when cod-liver oil was given. Butter, which is an animal oil as truly as the oil of the cetaceans and fishes, acted analogously to the latter.

We always follow this method for persons who are too much opposed to the use of cod-liver oil. In order to sustain the confidence of the parents, who cannot see how so simple an element as butter can have virtue, we often add to it some of the elements of cod-liver oil. Our most usual formula is the following:

Very fresh butter.....	300 grammes (nearly $\frac{7}{8}$ x.).
Iodide of potassium....	0·05 centigrammes (gr. 0·008).
Phosphorus.....	0·003 “ (gr. 0·00046).
Bromide of potassium ..	0·3 “ (gr. 0·046).
Chloride of sodium ....	1 gramme (gr. 15).

Misce secundum artem.

This quantity is to be used in three days, upon bread. The phosphorus may be omitted without doing much harm.

In England, the oil is sometimes replaced by fresh cream, to which is added salt, sugar, or rum. M. Fonssagrives has used it with success (*Bullet. de therap.*, 1861, t. LXI.).

Bauer, of Tübingen, has used in several diseases different classes of oil, as that of olive, poppy, flaxseed, and fish; these have been applied only to the outside, by friction of the whole surface of the body, using a fine sponge, and the oil being previously warmed somewhat. The evening was the usual time for the friction; the patient was then wrapped in a woollen covering and left for two hours. In the majority of the cases, abundant sweating of the entire surface formed the first phenomenon, and in children it was often accompanied by an eruption somewhat resembling roseola.

A second remarkable effect was a calm of the nervous system, which soon produced a quiet, deep sleep. The third was an increase of all the secretions, an easier expectoration, more abundant urine, and a beneficial activity of the liver. The latter effect was quickly observed in children; the stools, which had been green and acid-smelling, became yellow and normal in aspect.

We may then look for salutary effects from oily friction in all such affections as nervous pains, convulsions, rheumatism, etc., where the above calming effect is the principal one desired.

It must be allowed that the use of oil, internally or externally, presents many inconveniences. If put into the stomach we have to fear indigestion or disgust, if it is used for a length of time; and its use by friction is uncleanly. But the annoyances attending upon its external use may be much more easily borne than those which are caused by continued ingestion. Dr. Bauer's experiments were all made with frictions. He cites eight observations in which he used various oils for very distinct forms of scrofulous disease, especially in children. The results were entirely in agreement with what has been said above. In cases where the disease originated in the retrocession of an exanthema or the disappearance of a strumous malady, frictions with oil recalled the eruption, even after several other means of attaining this end had failed (*Bull. de la soc. méd. de Gand*).

## ARSENIC.

### *Therapeutic Action.—Internal use.*

*Intermittent fevers.*—The principal chief reputation of arsenic was acquired by its use in intermittent fevers; a reputation, however, which has been much contested. This use was not known in Europe until the end of the seventeenth century and the beginning of the eighteenth. Gohl speaks of a Prussian army surgeon who gave to soldiers that had intermittent fever, small doses of a powder containing three parts of arsenic and one of nitre, a remedy which, according to the testimony of



Gohl, which will not be questioned, was very certain, but at the same time very injurious, "certissimum at nequissimum" (*Comment. in act. med. Berolin.*, Dec. 4, v. iii., p. 6). Lemery, in his chemistry, speaks of its frequent employment in France by charlatans and army surgeons for intermittent fevers. The testimony of Van Helmont, Zeller, Wepfer, Stahl, is to the same purport (Harles: *loc. cit.*, pp. 60, 61, 62).

The first grave authority that wrote upon the febrifuge virtues of arsenic was Hadrien Slevogt, Professor at Jena ("De exceptionibus, sive permissione prohibitorum, et prohibitionem permissorum," Jena, 1700); and a little later, the remarkable work of Melchior Frick (Friccius), a physician of Ulm, appeared.

Slevogt, having used arsenic for years in tertian and quartan intermittents, declared it the supreme febrifuge, and very superior to cinchona. By its use he avoided the relapses and the accidents consecutive upon intermittent fever and the use of cinchona. He gave arsenic on the days of apyrexia, and even on the day of fever at the beginning of the access, in the dose of from 2 to 7 centigrammes (gr. 30—105) according to the patient's strength, but associated theriac with it, to moderate its irritant properties. Melchior Frick, by the facts which he published, gave arsenic a much greater importance as a febrifuge. He commonly used orpiment, which he mixed with rock-crystal and camphor, making a powder. This powder he affirmed to be superior to cinchona, and he never saw a patient that was not cured by it. His success was such as to give rise to the following language: "Experientia nos docebit, arsenicum in febribus intermittentibus adhibitum omnes eas dotes possidere, quibus optima remedia prædita esse debent" ("Paradoxa de Venenis," 1710, p. 30 et seq.).

To this testimony we may add that of Keil, Bernhardt, J.-C. Gmelin, Don Monro, Jacobi, Huermann (v. Harles, *l. c.*, p. 66 et seq.); but the two Plencitz', towards the end of the last century, established the reputation of arsenic as a febrifuge. ("Acta et observ. med.," Prag. et Viennæ, 1783, cap. iii.). These two physicians gave arsenic at the Vienna orphan asylum, to an immense number of patients with tertian and quartan fever. They never saw bad effects, and the remedy seemed to them surer and quicker than any they had previously used. They employed arsenious acid in the enormous dose of 2—5 centigrammes (gr. 0.3—0.8). The remedy was used with almost constant success in thousands of cases of intermittent fever. "Ejusque usu in millenis fere febrium intermittentium casibus raro frustratos fuisse affirmant." Harles is rightly surprised that such marked success did not establish the use of arsenic in Austria and Hungary, but explains it by Stoerck's opposition to arsenic, an opposition the more powerful from the fact that he held a leading rank at court and in the schools.

While arsenic, as recommended by the Plencitz', failed to make head against the envious hostility of Stoerck, it was becoming popularized in England by Thomas Fowler ("Medical Reports on the Effects of Arsenic in the Cure of Agues, Remittent Fevers, and Periodic Headach," 1786).



Among 240 cases of intermittent fever, 171 were perfectly cured by arsenic, 45 resisted it and were treated successfully by cinchona, and 24, who did not strictly observe the rules of treatment, were not cured. Arnold cites 24 cases of success in tertian and quartan fevers, and very rarely had relapses. Freir, of Birmingham, claims to have cured more than a thousand workmen without ill consequences by Fowler's method.

At the same time as the latter, Robert Willan and Richard Pearson contributed much to the adoption of arsenical preparations among the physicians of Great Britain in intermittent fevers. Willan's testimony is very strong: "I know of no remedy more sure, more efficient and easier to take, in the treatment of intermittent fevers, than this (Fowler's) arsenical solution." Pearson, who modified the solution a little, and gave his own name to it, as Fowler had given his to that which he had invented, bestowed upon it his full confidence, which the public shared when a prince of the blood, the Duke of York, was cured by arsenic of an intermittent fever, which had previously resisted cinchona.

These numerous examples and publications gave to arsenic a reputation which had begun to spread in France and America, when the wars waged by Great Britain against the United States and our Revolution broke off all her scientific relations, and some of our physicians, Valentin, Desgranges, Fodéré, Dufour of Montargis, Bouillier of Pont-Saint-Maxence; in Italy, Brera, and in Germany, Harles, preserved the traditions of Slevogt, Frick, the Plencitz', Fowler, and Pearson. Harles, in particular, in his important monograph on arsenic, placed before the medical public all previously published experience, reported his own results, and contributed more than any one to spread the use of arsenic. But, in spite of new facts, again collected in France by M. Gendrin, the invasion of physiological medicine, so noxious to therapeutics, opposed the introduction of arsenic into French practice, and at that period there were perhaps not twenty physicians in the country who dared to use a remedy, which was universal among our neighbors beyond sea.

M. Boudin, however, a former physician in chief at the Hôpital militaire du Roule, at Paris, after numerous trials upon himself, brought arsenic into honor among us.\* He introduced precise rules for administration, previously unknown, and demonstrated a law of tolerance, the knowledge of which seems to us to assist greatly in the handling of arsenical preparations. The number of intermittent fevers which have been treated by this physician in the hospitals of Marseilles, Versailles and Paris, equals the enormous sum of more than four thousand; and such seems to be the perfection of the method, that he states that he has not once had to resort to sulphate of quinia since the end of 1843; a result very different from that of Fowler, who cured only 171 out of 240 cases of fever.

Boudin's rules are the following:

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\* Boudin: "Traité des fièvres intermitt. et contag. des contrées palud.," followed by "Recherches sur l'emploi thérap. des prépar. arsenicales," Paris, 1842.



*First rule.*—Commence with an emetic (Ipecac, 1 gramme ( gr.15); tartaremetic, 1 decigramme (gr. 1·5) ), if the fever is associated with gastric embarrassment, suppression or diminution of appetite. When the fever has been broken, return to the emetic, if the appetite is at all backward, in order to give full opportunity for a substantial and abundant diet.

*Second rule.*—Give arsenious acid in divided doses, the last portion being administered at least two hours before the expected attack; make the dose proportional to the character of the fever, which varies according to place, season, and individuality.

Take advantage of the tolerance at the onset to raise the dose of arsenious acid as high as possible, giving every quarter of an hour 1 milligramme, or only  $\frac{1}{2}$  milligramme—1 gramme or  $\frac{1}{2}$  gramme of the solution (=gr. 0·008—0·015; gr. 8—15). As the tolerance lessens, diminish the dose by degrees, and insist on subdivision; and if there is opportunity, give a part or the whole by the rectum. By the latter method, 5, 10 centigrammes, and even more, are borne, when the stomach has ceased to bear one centigramme (=gr. 0·8—1·5—0·15). Give the remedy on the days of intermission as on those of access.

Continue for a time proportionate to the duration of the disease and its previous obstinacy under treatment. In first attacks, continue it at least a week after the accesses have wholly ceased. In old obstinate cases, continue for thirty, forty, fifty days, and, if necessary, longer.

*Third rule.*—Let the diet be substantial, as abundant as possible, and limited only by the appetite and the power to digest. Let it consist by preference of roast beef or mutton; let generous wine be drank, in proportion to the deterioration which the patient's constitution has suffered; let watery drinks be abstained from as far as possible.

To sum up: emetics, to relieve gastric oppression, and suppression or diminution of appetite at the beginning, or persistent. Dose of arsenious acid proportioned to tolerance, subdivided, and continued without interruption for a time proportioned to the duration and obstinacy of the fever. Administration by the mouth or the rectum, according to circumstances. In a word, oppose a sort of arsenical diathesis to the paludal diathesis. Nourish abundantly; sweep the patient along; grade the three parts of treatment in such a way as to make the time most profitable to the patient. Such are the rules followed by M. Boudin, the strict observance of which he recommends to those who wish to derive the most advantage possible from febrifuge treatment.

This treatment does not consist in a simple substitution of arsenic for cinchona, but in a complex medication, in which arsenic is seconded by two powerful agents, emetics and good feeding. The evacuants relieve gastric embarrassment and hasten the return of appetite, the regimen shortens convalescence, combats the tendency to relapses, and prevents the manifold consecutive troubles which seem connected with poverty of the blood.

*Tolerance.*—Many patients, says Boudin, bear 5 centigrammes (gr.



0·77) of arsenious acid perfectly well at the beginning, but cease to tolerate it after two or three days, when the fever is broken. The intolerance appears in nausea, headache, loss of appetite; in a higher degree, it causes vomiting and diarrhœa. The physician should be careful to follow the oscillations of tolerance, and to adapt his doses to them; diminishing the dose as toleration lessens, insisting on subdivision, and administering per rectum if necessary. One who has ceased to bear 1 centigramme (gr. 0·15) by the mouth will often bear 5, 10, or even 20 by the rectum. M. Boudin, when sick, tolerated 10 centigrammes (gr. 1·5) of arsenious acid by the mouth; but, when in health, he has experienced abundant salivation and slight nausea, after taking only 2 centigrammes (gr. 0·3). But this rule is subject to exceptions.

*Dose.*—This is not fixed, but must be adapted to the special genius of the fever and the patient's tolerance. It is as undesirable to give too little as too much. By neglecting this rule, temporary inconvenience has been caused, or a part of the effect has been missed. M. Boudin has often had success with one milligramme (gr. 0·015). In other cases he has had to raise the dose to 5 centigrammes (gr. 0·77) and more in the 24 hours.

*Action on the spleen.*—M. Boudin's experience has perfectly demonstrated the disappearance of splenic engorgement, under the influence of arsenical treatment.

*Relapses.*—The small proportion of relapses indicates the same fact. The relative infrequency of relapses may depend on the disappearance of splenic engorgement, or the intermittent fever may be independent of the engorgement; in the latter case we need not give attention to it.

M. Maillot's experiments at Lille gave 15 relapses out of 42 cases treated by sulphate of quinia in a period of five months, or 84 relapses to 100 fevers in a year.

M. Masselot (*Arch. gén. de méd.*, 1846), among 311 intermittents treated at Versailles by Boudin in 32 months, counts but 10 relapses, or 1·2 per hundred in a year. The numerical results seem thus far to be in favor, if not of arsenic, at least of M. Boudin's manner of using it.

*Prophylactic administration in marshy regions.*—Boudin, arguing from the extreme rarity of relapses after arsenical treatment, and the rarity of fevers which Dr. Stokes has noted in a marshy district of Cornwall, has proposed the use of very small doses, say 1 milligramme (gr. 0·015) of the acid per day as a preventive. The harmlessness of this practice has been proved; its efficacy remains to be determined.

M. Boudin's success has been confirmed by that of a great number of practitioners, which the medical press has recorded. We will only recall the essays of MM. Néret at Nancy, Tessier at Lyons, Maillot at Lille, Bernier at Sarreguemines, Leterme at Luynes, Mazière at Ile-Boin, Vaulpré and Travail in the marshes of La Bresse, Vérignon at Hyères, Portafax in Corsica, Garbiglietti at Turin, Rouis in Algiers, Sigaud in Brazil, of Conet, first medical officer of the navy at Guadeloupe, and the recent successes of Dr. Sistach, M. Millet of Tours, and Frémy of Paris.



Finally, Goldschmidt, physician to the penal colony of Ostwald, at the request of Hirtz, has experimented upon the comparative value of sulphate of quinia and arsenic, arriving at nearly the same results as those of Boudin.

*Neuralgias.*—The watery solution and the powder of arsenious acid have been used by M. Boudin on a large scale in neuralgia. He states that he has been constantly successful when the disease was of a pronounced periodic type; much less so when this was not the case.

In rebellious neuralgias, especially those which return periodically, cinchona or sulphate of quinia must be given in such large doses as often to injure the digestion or the nervous system. The disease often reappears in spite of the cinchona, and then this remedy is inadequate. These are cases in which arsenical preparations render services which no other remedy could supply.

The title of Fowler's paper sufficiently shows that he had found arsenic useful in periodic neuralgia; he reports seven cases of cure. Hoffmann gives the following (Harles: l. c., p. 331): a man of 49 years had had for a certain time a periodic headache which returned at seven every morning and lasted till one in the afternoon; the pain was so great as to cause furious delirium. Opium, valerian, ammonia and other remedies had been used in vain. At last the arsenical elixir was used, with infusion of valerian and of sweet flag, when the complaint disappeared in one day. In the *Revue médicale française*, mai, 1828, we read the history of a nervous headache which had lasted for years and was cured with arsenic by Dr. Alexander. Cahen, physician to the hospice Rothschild, has treated 65 neuralgias with arsenic, with almost constant success (*Arch. de méd.*, 1863).

*Chronic rheumatism, especially arthritis nodosa.*—H. Guéneau de Mussy has proposed arsenical baths as an effective remedy in nodose rheumatism. He distinguishes two categories; in one, the process is frankly chronic; in the other, the disease is more recent, the reaction lies in the background, the nervous excitability very prominent; or else the disease, though very old, belongs to that class of chronic affections which seem composed of a long series of crises more or less acute—chronic in the obstinate persistence of the process, and acute in the manifestation. In the former case, when the chronic condition is unequivocal, he uses the following mixture for a full bath:

Subcarbonate of sodium.....	100 grammes (gr. 1543).
Arsenate of sodium.....	1 gramme (gr. 15).

He raises the dose of arseniate rapidly to 2 grammes, which he rarely exceeds.

In the second case, if there is reason to fear excitement, he uses arseniate of sodium alone, in the dose of 1—3 grammes (gr. 15—45) in a simple or gelatinous bath.

At the outset he gives a bath every other day; later, one every day,

with occasionally a day for rest. The duration of treatment depends on the effects produced. One of M. Guéneau de Mussy's patients had as many as sixty baths.

Concurrently with the baths, he used to give decoction of guaiac, and a mixture containing from 60 centigrammes to 1 gramme of extract of cinchona (gr. 9—15), and from 30 centigr. to 1 gramme of iodide of potassium. To anticipate a natural objection to this complex treatment, he remarks that this mixture, employed alone for fifteen years, had given no result. The author has further tried this treatment successfully in all the forms of chronic rheumatism, in various neuralgias, in a case of rheumatismal paraplegia and certain chronic affections of the skin (*Bulletin de thérapeutique*, 1860).

*Herpetism.—Dartres.*—The French pathologists have long used the word dartre, without a very exact meaning; it merely designated rebellious cutaneous affections with a tendency to become generalized. The tendency of to-day is to associate eruptions with diseases of which they are symptoms. Hence Lalouette's descriptions of scrofulous eruptions or scrofulidæ, Bielt's of syphilidæ, Franck's of arthritidæ, Rayer's of artificial affections; to which Bazin has added a chapter on parasitic diseases. But some remain unclassified; there is a series of cutaneous manifestations which possess in the highest degree this refractory character and this tendency to relapse and to generalization. Have these a common link, and do they belong to a general malady? M. Bazin believes this to be the case; and he gives to them the name of herpetidæ.

According to him, dartres are cutaneous affections, non-contagious, obstinate in relapsing, and originating not in one single vice, the dartrous diathesis, as Hardy thinks, but in three, scrofula, arthritis and herpetism. Bazin admits that there are herpetic nervous and visceral affections, as there are internal scrofulous manifestations; among the chief of which are dyspepsia, asthma, dysmenorrhœa and certain neuroses, nervous erethism being the leading symptom of all the herpetic affections.

Why have M. Bazin's opinions not had more adherents? It is because this disease or class of diseases includes affections as numerous as varied, more difficult to classify than the scrofulous, syphilitic, gouty or rheumatic; they are not merely hereditary diseases, but are par excellence family and race diseases, and lose their character as they are transmitted. But, remarkably enough, these affections, which become degraded more and more in the process of transmission, may at last break out in a frankly herpetic form; a real alternate generation, as it would seem. If it were not so, there could happen but one of two things: either the hereditary disease would continue to reproduce itself with the same character, or it would disappear completely. (See, for further details, Pidoux: Introduction to a New Doctrine of Pulmonary Phthisis, *Union médicale*, avril et mai, 1865).

The apparent result of a great number of modern researches is, that arsenic is good for all these affections.



The herpetic eruptions form three groups: 1, the pseudo-exanthematous herpetides, superficial and rapid in their course, behaving in general like accidental acute maladies, and not directly requiring arsenical treatment; 2, the circumscribed herpetidæ; 3, the generalized or inveterate herpetidæ. Arsenical medication is suited to the two last groups, which include pityriasis, psoriasis, prurigo, lichen, furuncle, eczema, and pemphigus.

*Various nervous affections.—Epilepsy.*—The monograph of Harles reports four cases of epilepsy cured by arsenic (p. 324). One was observed by Edward Alexander, an Englishman; the second by Duncan of Edinburgh; a third by Hoffmann, and a fourth by the author. The two latter cases seem especially satisfactory; but what are we to infer from two cases, especially cases of epilepsy? The same author quotes cases of the cure of St. Vitus' dance by arsenic.

*Nervous state.*—The so-called nervous temperament, when developed into a pathological form, becomes nervous erethism, and may exist independently and alone, or be attached to ordinary diseases, stamping accidental or other affections with its constitutional or hereditary vice. It easily engenders hypochondria, hysteria, neuralgia and the visceral neuropathies. This state is beneficially affected by arsenic, as has been proved by an excellent paper by M. Isnard of Marseilles (*De l'arsenic dans la pathologie du système nerveux*, Paris, 1865). While stupefians, sedatives, antispasmodics, etc., have to be employed for the disturbances of sensation and motion, iron and cinchona for the atony and anæmia, and a crowd of other remedies according to symptoms, arsenic may take the place of all of them, deserving (according to M. Isnard) to be the medicine of the nervous state, and (according to Bazin) to be the specific remedy of herpetism.

Isnard considers it one of the best tonics in convalescence from acute diseases. Given to pregnant women with nervous erethism, it is of great use, especially at the beginning of pregnancy, and may be preferred to opium and belladonna, or at least may be placed by their side. He has succeeded in supporting with it the strength of women who were overtaxed with nursing.

*Cerebral congestion and apoplexy.*—Dr. Lamare-Picquot, of Honfleur, has proposed arsenious acid as a preventive of apoplexy. We do not vouch for its efficacy, which has only been tested by the author upon his own person, and in the case of twenty-three patients whom he says he cured by this remedy. The observations of M. Cahen "*Arch. de méd.*," 1863, in which congestion connected with neuralgia was relieved by arsenic may, like those of Isnard, support those of M. Lamare-Picquot.

*Angina pectoris.*—This is one of the most atrocious of diseases. We have given temporary relief by stramonium, but the attacks returned with a ferocity which destroyed hope. If the case given by M. Alexander is true (as we may not doubt), arsenic rendered immense services to him in such a case. The patient was a man of fifty-seven, affected with



angina pectoris of the severest kind. He took six drops of Fowler's solution three times a day, and had no fresh attack. But as slight symptoms of the access were observed, Alexander resumed the remedy, and the cure remained complete (Harles: l. c., p. 329. M. Garin, of Lyons, likewise cured a periodic neuralgia of the heart. If there be a question between an organic and a nervous affection of the heart, arsenic may render valuable help in diagnosis.

M. Tessier, of Lyons, has published in the *Journal de médecine de Lyon* (mai, 1848) two interesting observations upon the use of arsenical preparations in extremely severe neuroses. The first case was one of intermittent neurosis of the heart and the organs of respiration, in a man aged sixty-six; the other was a gastralgia with atrocious pain in a woman of thirty-three. The first case was cured, the second only improved.

*Asthma*.—The reader will remember accounts of the poison-eaters, and especially, the custom existing among certain mountaineers, of swallowing a little arsenic to give themselves wind and endurance in climbing, or, as they say, to make them "volatile," when they are setting out for a journey in the mountains. The drivers in these countries follow a similar practice with their horses, mingling arsenic with the oats when they have a severe climb to perform.

Led by these hints, Dr. Koepl made a trial of the virtues of arsenic in certain functional troubles of respiration. He gave Fowler's solution to several persons affected with asthma, and states that they derived marked benefit from it.

At the beginning of this article we gave the opinions of the ancients, beginning with Dioscorides, who praised arsenical drugs used for fumigations or taken internally, in the treatment of chronic troubles of the chest or larynx. When our first edition was published we had never tried these medicines, nor even seen arsenic prescribed in thoracic diseases; but we must say that our reading of the authors who have paid attention to arsenic had convinced us that it was evidently useful in intermittent fevers, and equally so in chronic catarrh and spasmodic asthma. The testimony was too full to permit us to doubt this; but to-day we can speak from personal experience.

"It is given internally," says Dioscorides, "to patients who have pus in the chest. Mixed with honey, it makes the voice clearer, and it is given to asthmatics in draughts with resin. In inveterate coughs, the patient is made to breathe through a pipe the vapor of a mixture of resin and arsenic."

It is needless to quote again from Pliny, Galen, and his Arabic commentators, who seem to have all copied Dioscorides, and have perhaps adopted the master's dicta without having tried for themselves; but, at a more recent date, attentive observers have shown by experiment the truth of the statements of Dioscorides and his followers.

At the close of the sixteenth century, George Weith invented an electuary containing orpiment, which he gave in considerable doses in the



severest cases of asthma (Jo. Languis: "Epistol. med.," Hanov., 1605, p. 847). It appears from this author that the use of arsenical fumigation in asthma was in a way popular in certain climates of northern Europe. Ettmüller gave asthmatic patients a mixture of tobacco and arsenic to smoke, and by degrees increased the dose of the latter to the enormous quantity of 75 centigrammes (gr. 12) without the slightest accident (Harles: l. c., p. 328).

Dr. Koepl was one of the first to follow these indications, and to try Fowler's solution in certain cases of asthma; an experiment which met with the hoped-for success in quite a large number of cases. His experience has been repeated by others; and as regards ourselves, we have used arsenical preparations internally for several years, and have found that they rendered real service. We most commonly prescribe arsenite of sodium in the following draught:

Arsenite of sodium.....	0.05 (gr. 0.77).
Distilled water.....	100 (gr. 1540).
Tincture of cochineal to color.....	q.s.

The patient takes a teaspoonful of the above at the beginning of each of the two principal meals—a precaution which may assist in enabling certain delicate stomachs to tolerate it. This dose represents about  $2\frac{1}{2}$  milligrammes (gr. 0.038) of the arseniate of soda.

We also order the inhalation by arsenical cigarettes. For this purpose a solution is prepared, containing from 1 to 4 grammes (gr. 15—60) of arsenite of sodium in 20 grammes of distilled water. A leaf of papier Joseph is soaked in this solution, dried, divided, and formed in the shape of a cigarette; thus each one contains a known weight of the salt, from 5 to 20 centigrammes (gr. 0.77—3.0). The patient lights the cigarette, fills his mouth with smoke, and then by a slow inspiration draws it into the bronchi. At first, four or five mouthfuls are breathed twice or three times a day; and as the patient becomes accustomed to it the number is increased. When there is great oppression, leaves of datura stramonium should be included in the cigarette.

In this simple process the arsenical salt is reduced by contact with the carbon in the incandescent paper, forming carbonate of soda, oxide of carbon, and volatile arsenic, which is carried by the smoke into direct contact with the pulmonary mucous membrane.

According to M. Viaud-Grand-Maraîs these inhalations are most successful in that which Laennec called asthma with puerile respiration, and in emphysema. M. Sée (l. c.) reports similar success; also an observation by Dr. Julius, who quickly relieved a lady who had been asthmatic twenty-five years.

*Chorea.*—We owe to M. Gellé, a former interne of Gillette's at the Children's Hospital, an excellent thèse (1860) upon the use of arsenic in chorea, from which we borrow most of the following details.

In the *Gazette médicale* of 1840, p. 139, it is stated that Dr. Leesse of New York gave Fowler's tincture in the dose of six or eight drops morning and evening to patients from eight to ten years old. M. Rayer obtained good results likewise (*Union médicale*, 1847). In England the remedy has often been used with success by Martin, Gregory, Latter, and more recently by Babington, Hughes, and Begbie. Romberg saw a cure effected in two months under the influence of this treatment; M. Dieudonné has seen the movements disappear in twelve days. M. Barthez noticed distinct improvement on the second day in one case, and in another case a cure on the eighth day. In an observation of Aran's, a young girl resumed the use of her needle on the eighth day. Guersant père first observed improvement on the second day. Among Gillette's cases, collected by Gellé, there were several which felt the influence in 36 or 48 hours; but in general the action was manifest from the fifth day, and more so on the eighth, with a distinct improvement in the patient's condition.

M. Gellé has also sought to define the indications and the contraindications for arsenical treatment in chorea. It appeared to him that it failed in nervous and sanguine patients, who were improved by emetics and opium. Arsenic, on the contrary, succeeded admirably in patients suffering from privation, lymphatism, chlorosis, and cachexia. This opinion is that of Romberg and Bourguignon. Much more than this: in three severe cases, in which the incessant movement wore out the clothes and the skin, deglutition was impossible, the sphincters relaxed, etc., arsenic was also useful, producing a rapid improvement, and a cure in twenty days.

M. Letenneur, of Nantes, cured four choreic patients in a very short time by giving twice a day a teaspoonful of a solution containing  $\frac{1}{1000}$  of arsenious acid, or one centigramme per diem (gr. 0.15) (*Journal de médecine de l'Ouest*, nov., 1867).

*Chlorosis.—Dysmenorrhœa.*—Nothing is more common than for the daughters of dastardly persons to have difficult menstruation, accompanied by hystericalgia and the phenomena which it produces by reflex action. In a higher degree there is amenorrhœa, with the same symptoms and consecutive anæmia. The first thing given is usually iron, which succeeds the first time, but a year or eighteen months later the dysmenorrhœa reappears, iron is given again, but, to the surprise of all, it increases the symptoms instead of relieving them; if arsenic is then used, a success is obtained which is sufficiently explained by the subsequent development of the patient's health, or rather, her pathology. We employ in such cases arsenious acid in preference to arseniate of iron, which is less successful.

*Phthisis.*—Are we to believe that Beddoes (quoted by Girdlestone) treated successfully a phthisical man, two of whose brothers had died of mesenteric consumption; that Bernhardt ("Chymische Versuche," p. 233,) cured a number of children of mesenteric tabes by giving them three times a day a small dose of an arsenical preparation; and that Ferriar ("Med.



Facts and Observ.") gave Fowler's solution with advantage at all stages of whooping-cough?

In 1841, having made trials upon phthisical patients and those affected with chronic catarrh of the larynx, we said that we had obtained in phthisical cases not cures, but a suspension of the symptoms, which is very extraordinary in a disease whose fatal progress is arrested by nothing. We have seen the diarrhœa moderate, the hectic diminish, the cough become less frequent, the expectoration assume a better character—but we have not cured. New tubercles formed and softened, and death followed; it was postponed, it is true, but it was inevitable. Yet our results have served to encourage us, and nothing prevents our hoping that, in cases of limited extent, we may obtain a complete cure.

Since this time we have given arsenic in phthisis on a very large scale, and with the following results: In the first place, when arsenic acts well in phthisis, it does so promptly. What distinguishes it essentially from the water of Eaux Bonnes is that its action requires no period of incubation. We have never seen it produce either those immediate aggravations which are sometimes prolonged for several months after a season at the baths, and which are followed by such a remission in the symptoms as never occurred before the remedy was taken; or the critical and salutary appearance of a cutaneous affection, of neuropathic symptoms, of piles, gravel, arthritic or herpetic symptoms several months after the minero-thermal impregnation, at a time when, none of the remedy having been taken in the interval, its effect might have been supposed to be negative. The action of arsenic is immediate or nothing. It somewhat resembles that of a food, which acts at once, lasts for a short time, and requires to be renewed.

Whenever we have seen arsenic produce good effects in phthisis, it has been immediately, without appreciable pathogenetic phenomena, without a period of incubation, without ulterior critical or salutary manifestations. Here, as in the case of quinia, the symptoms are immediately suppressed.

When arsenic excites the appetite and restores hæmatisis by its rapid stomachic action, these good effects, promptly obtained and purchased by no disturbance or risk, are apt to lead astray. At the first glance (which is too often the last) one may suppose oneself in possession of the ideal remedy; but all these effects are specious rather than profound.

To obtain the restorative and sedative effects of arsenic in phthisis, it is well to remember that the remedy does not act at all when the patient does not eat, unless it produces its stomachic or excitant effects upon the appetite; it does not save waste, except by increasing the receipts of the system. Like cod-liver oil, arsenic, in order to develop its effects, requires exercise, and, up to a certain point, all the acts of ordinary life; it therefore is much less useful to consumptive patients in a hospital than in civil life.

In certain irritable persons it produces a sort of tension and conges



tion of the brain which somewhat resemble intoxication; they say that it "goes to their head." This property gives arsenic a resemblance to the agents which fix nutrition, such as coffee, tea, and coca. When this physiological action is kept within bounds, it is not inconsistent with the therapeutic effects we have named. But it has another and not a very rare immediate effect, which absolutely contraindicates its use. This is a certain spasm, apparently localized at the two orifices of the stomach, which paralyzes or obliterates the functions of that viscus. Several patients have mentioned to us this effect, accompanied by præcordial anxiety and a very painful and suffocating sense of arrested digestion. If this effect be not excessive, it still forms an absolute contraindication to the use of the remedy. It is not so with the slight colics, accompanied with diarrhœa, which arsenic sometimes causes.

Arsenic, then, seems to be an arrestive agent, a conservant. Like cinchona, it fixes the action of the vascular extremities and prevents their yielding to morbid or debilitating impressions. This is perhaps equivalent to saying that arsenic does not aid nutrition (Pidoux: "*Thérapeutique comparée de la phthisie*," 1873). M. Moutard Martin has tried the remedy on a large scale, and reaches nearly the same conclusions as ours (*Bulletin de thérapeutique*, 1868). He admits a very positive action of arsenic upon phthisis, especially when the disease has made little progress, is slow in its course, and attended with little fever.

In advanced phthisis with hectic fever arsenic has less marked effects; but they exist, and sometimes alleviate the disease—an effect for which we may well be thankful.

M. Moutard Martin very justly observes that success would be more frequent if patients were more persevering. Too often they mistake improvement for cure, abandon the hygienic measures and the treatment—and repent speedily.

*Chronic disorders of the digestive tract.*—At the beginning of this article we stated that the Styrian peasants took arsenic as a stomachic. Dr. Koepel has recorded a curious fact in his communication upon poison-eaters (l. c.), which deserves a place here.

A servant in a chateau wished to rid himself of a too strict housekeeper. For this purpose he added very small doses of arsenic to the lady's food for a long time, hoping that the chronic nature of the symptoms would shield him from suspicion. To his great surprise, the lady continued for months to improve in plumpness, complexion, and spirits. Seeing that small doses produced effects contrary to his wish, he added a much larger one to a fricasseed chicken; but the severity of the symptoms which followed soon raised suspicion against him, and he was delivered up to justice.

Some cattle-breeders, in order to fatten their oxen, calves and swine quickly, mix a little arsenic with their food, and succeed in giving them a good appearance in a very short time.

M. Tessier, of Lyons, whose observations on the use of arsenic in cer-



tain neuroses of the respiratory and digestive organs we have quoted, makes the important remark that in his experience he had found that arsenic stimulated the appetite and aided digestion, while diminishing the excessive susceptibility of the stomach. He further says that the remedy seems to him to have a favorable influence in certain chronic affections of the digestive tube, and especially in gastralgia. M. Legroux has benefited a case of diabetes by using arsenic and hydrotherapeutics.

These various facts, taken from physiology and pathology, joined to some analogous observations of our own, seem to us to justify the use of very small doses of arsenic in certain refractory diseases of the digestive organs, as dyspepsia, or gastro-enteralgia accompanied by rebellious diarrhoea, and certain cases of lenteria in cachectic persons, where nothing else is of use.

It is demonstrated that several mineral springs, including those of Mont-Dore, Bourbonne, la Bourboule, Vichy, Plombières, and especially Bussang, contain a dose of arsenic which is appreciable by analysis. Who knows but this dose of arsenic, hitherto neglected, may have some part to play in certain cures of chronic diseases of the digestive passages, all the honor of which is attributed to the alkaline salts?

Leared, a physician at the Great Northern Hospital in London, published in the *British Medical Journal*, Nov. 23 and 30, 1867, two articles, in which he reports good success from the use of an arsenical solution (probably Fowler's) in gastralgia. Leared carefully defines the nature of his cases, saying that the pains of the stomach were very intense, occurring when the organ was empty as well as when full, and often producing nausea, sometimes vomiting. This pain is accompanied by a sense of constriction, from which it often gets the name of cramp or colic of the stomach, and by its intensity causes a feeling of faintness and collapse. He considers arsenic wholly contraindicated when the pain is provoked by the ingestion of food, when there is pyrosis, and, of course, in cancer or ulcer of the stomach (*Bulletin de thérapeutique*, 1859, I., p. 49).

*Diabetes.*—We have sometimes given arsenic in diabetes, and the results have seemed to us not unfavorable. M. Devergie has observed the same improvement in several patients of his (*Traité des maladies de la peau*, 1862, p. 355).

MM. Legroux Foville père et fils, and Dr. Titon, of Châlons-sur-Marne, have obtained similar results (*Bulletin de thérapeutique*, 1870, I., p. 541). We must add an observation by Owen Rees (*Lancet*, 1854, vol. II., p. 436). But there have also been reverses. M. Brouardel (*Étude critique des diverses médications employées contre le diabète sucré: Thèse d'agrégation*, 1869, p. 63) recalls that Berndt was not very successful, and that two trials made by Lailler and Siredey only increased the glycosuria. These differences are doubtless owing to our very imperfect knowledge of the varieties of glycosuria. We may be able some day to define the indications exactly, and to distinguish the cases in which they will be useful.

*Pellagra.*—This disease often baffles our therapeutics; and it cannot



be out of place to mention six cures obtained by Dr. Marengli. Arsenious acid given in the dose of 2 milligrammes per day (gr. 0·03) brought back the appetite, then the strength, and the patients recovered, after a treatment of two or three months (*Gaz. méd. ital. Lombardia*, October 16, 1869; and *Bulletin de thérapeutique*, 1870, I., p. 40).

*Muscular atrophy*.—We shall make the same statement in regard to progressive muscular atrophy, and mention a remarkable case of cure by Dr. Da Silva Lima (of Bahia), in the *Union médicale*, nov. 30, 1869.

*Oxyuris vermicularis*.—We know not whether the experience of Cœlius Aurelianus, who advised arsenical injections for the destruction of intestinal worms, has been repeated. It is sufficient to know the parts inhabited by worms, in order to understand that injections can only be of use when there are pin-worms; and in this case, rectal injections with an arsenical solution cannot be too highly praised. While we were in service at a children's hospital, we had frequent occasion to use them. For an injection of 200 grammes ( $\frac{2}{3}$  viss.) from 1 to 5 centigrammes of arseniate of sodium or potassium (gr. 0·15—0·77) are dissolved in water. The dose would be enormous if retained, but the irritation it causes is so great that it is rapidly ejected, but not before the worms are destroyed.

A single injection is usually enough, but it is best to repeat it two or three days in succession, and, after an interval of four days, to repeat it two or three days more, in order to destroy the eggs and prevent all chance of relapse. We have never given arsenic internally for worms; it is probable, if not certain, that any safe dose would be absorbed by the stomach or duodenum before reaching the large intestine, which is the constant habitat of lumbrici and tæniæ. Perhaps realgar and orpiment, which are slowly soluble, might reach the large intestine without being wholly decomposed, and might act topically there, as arsenical injections do upon pin-worms. But, arsenic used in this way would be a dangerous weapon; and we advise physicians never to use it except in the case we have indicated.

Boudin gives arsenious acid in injections as a vermicide. Beginning with 5 centigrammes (gr. 0·77) he increases it gradually to 10, 15, and 20 centigrammes (gr. 1·5—2·27—3). He has treated tænia thus, giving arsenic at the same time by the mouth, in powder with white sugar, carrying the (divided) dose to 7 centigrammes per day. The patient passed large pieces of tænia, and all the symptoms ceased: but the case is recent, and he hesitates to declare the cure final.

*External use of arsenic*.—Dioscorides was well aware of the escharotic properties of arsenic: "Vim habet escharoticam cum ustione et cum morsione violenta" (Dioscor.); "Valet perrodere" (Pliny). Celsus, Galen, and many others knew of this property: "Arsenic omnes species sunt comburentes" (Rhazes); "Omnes species Arsenici escharoticæ sunt" (Avicenna). We shall presently see with what success the moderns have used preparations of arsenic in the topical treatment of cancerous ulcers. Théodore ("Chirurg.," lib. iv., p. 111) used these properties for the destruction of



fungous vegetations on scrofulous ulcers, obtaining an easy and regular cicatrization.

The present topical use of arsenic in very small doses produces a homœopathic, that is, a substitutive action, which is of great use in hastening the cure of chronic ulcers, phagedænic dartres, and most chronic affections of the skin. The remedy was universally adopted in the treatment of cutaneous disorders down to the time when mercury took the supreme position which it so deserves. Arsenic, as a local remedy in ill-conditioned ulcers, is sometimes more useful than mercury, but it needs to be handled with extreme care and in minimal doses. A physician of Paris, who, to his disgrace, makes a secret of the remedies he uses for cancer of the womb, produces a beneficial change in the amount and the odor of the discharge, and evidently prolongs the patient's life, by lightly touching the neck of the womb with cotton impregnated with arsenical oil. The oil must be left but an instant in contact with the part, and the amount of arsenic must be very small (5 parts in 400, for example), as stronger doses give rise to inflammatory accidents which it is not always easy to arrest.

In small doses, these preparations may cause a very violent inflammation, and in a larger dose they destroy the life of the parts they touch. These have therefore been used for the double purpose of producing local modifications, either by exciting inflammation of another character, or by destroying the superficial diseased tissue, while in the deeper parts arsenic produces the alterative effects of which we spoke above.

When a local inflammation on the surface of an ulcer or wound is to be produced, very small doses must be used, 5 centigrammes (gr. 0.77) of arsenious acid or arseniate of sodium, to 8 grammes (3 ii.) of cerate, or twice as much of the sulphide. To produce superficial eschars, the doses will have to be much larger.

The most celebrated arsenical powders used for this purpose are those of Justamond, of Friar Cosmo, and of Plunket, that of Rousselot, which is almost the only one used, and is almost the same as Cosmo's, and that of Dubois, which differs little from Cosmo's and Rousselot's.

These powders have been chiefly used in treating superficial cancers of the skin; they are made into a paste with saliva or gum-water, or simple water or a little white of egg, and are spread on the diseased surface. Certain precautions are important.

Some surgeons used to excise the cancerous surface, to remove all the indurated nodules with the bistoury, and to cover the wound directly with arsenical paste. This practice was followed in several cases by severe toxic symptoms which threw great discredit upon the paste. But Dubois, remarking that the absorption was rapid in proportion as the cut surface was recent, but was almost null when suppuration was well established, laid it down as a rule to excise the cancerous surface first, and not to apply the paste until four days after. Although by this means the absorption is generally avoided, nevertheless, when the surface is very ex-

tensive, the poison often causes death. Hence the precept, to cover the surface piecemeal, and make but one application a day.

The first effect of the arsenical paste is a very violent pain, and an erysipelato-phlegmonous inflammation of great extent, lasting usually from four to eight days. The eschar, of a thickness proportioned to that of the layer of paste, separates slowly, and usually does not fall until from the fifteenth to the thirtieth day; cicatrization is usually nearly complete, and the skin without tubercles. If any suspicious vegetations remain, they must be checked with Vienna caustic or acid nitrate of mercury.

Dupuytren thought it was not necessary to produce an eschar, but that an arsenical preparation which would cause a violent inflammation was sufficient to cure superficial cancers of the skin. He ordered the following powder: Arsenious acid, 5 or 6 parts; calomel, 100 parts. This he made into a paste with a gummous solution, and applied it to the diseased portions, removing it in two or three days, and renewing the application five or six times, according to the exigency of the case.

In lupus, in rodent dartres, the same paste is incontestably useful; other preparations of arsenic should be given at the same time, as we said above.

*Diseases of the eyes.*—The irritant properties of arsenical preparations led the ancients to use it in collyria, as we do the mercurials.

*Depilatories.*—Arsenical preparations have, from all antiquity, entered into the composition of most of the epilatory powders and pomades; and such is the case at present. It is singular that the ancients, Dioscorides, Pliny, Galen, etc., while mentioning this property, state that it is very useful in alopecia. It is useful, no doubt, in alopecia due to chronic disease of the scalp, when it acts as it does in most of the cutaneous affections which it cures. As a depilatory, arsenic acts immediately, and is used in large doses, while for those diseases which cause alopecia it is given in minimal doses, so as to cause only a transient irritation of the skin.

## GOLD.

### *Therapeutic Action.*

*Syphilis.*—The beneficial action of gold in the treatment of syphilis is incontestable. We may read in the writings of those who have treated this point, observations which prove this action. M. Legrand's work, which has, unfortunately, no résumé, contains quite distinct evidence of this. He first reports cases of primary syphilis cured by the administration of gold, most of which were severe enough to remove the suspicion that they recovered spontaneously. According to him, the influence of gold becomes much more evident when the primary symptoms are of long standing; that is, when the syphilis is inveterate. In this case expectation only makes the disease worse. These primary symptoms included



all those which were seated on the genitals or in the neighborhood, as chancre, vegetations, buboes, rhagades, fissures, etc. An equally numerous series of observations prove the good effect of gold in secondary and constitutional accidents, such as ulcers of the nasal fossæ, pharynx and larynx, cutaneous syphilidæ, exostoses, necroses, caries, venereal phthisis.

The effect on blennorrhagia seems to have been less manifest.

During the administration of gold, in constitutional syphilis, certain phenomena are often noticed, about which the physician should be informed, if he would not fall into a grave error of treatment. Sometimes, under the influence of auric preparations, all the local syphilitic symptoms assume an aggravated intensity, and even new ones appear. These phenomena, far from calling for apprehension, are desirable, for the disease retrogrades rapidly in a few days after they appear. It is, then, very important that the physician should retain confidence, and be able to inform and reassure his patient.

Among the advantages claimed for gold by its partisans, in primary or secondary syphilis, it may be stated that it is usually not necessary either to stimulate the excrescences or to make use of any topical application. But advantage is sometimes derived by dressing bad ulcers with a pomade of gold, or by rubbing syphilitic engorgements with the same pomade.

Dietrich, who has published an interesting paper upon the mercurial disease, denies to gold the possession of any antisiphilitic virtue; but he regards it as the most powerful remedy of the mercurial cachexia, and believes that its success in constitutional syphilis is almost always due to the fact that the supposed syphilis is only the expression of an intoxication caused by the use of mercury (*Jour. des connoiss. méd.-chir.*, 1840, juillet). The opinion of Dietrich seems to us untenable, and to be refuted by facts; but it is none the less true, that gold, in secondary venereal symptoms which have resisted mercury, ought to occupy an important rank, along with iodide of potassium.

*Scrofula.*—Recent cases published by Legrand (*Journ. des connoiss. méd.-chir.*, t. V., 4<sup>e</sup> année), bear witness in favor of the preparations of gold in scrofula. He gives gold internally to modify the constitution and combat the scrofulous vice, and at the same time he treats topically, by pomades containing gold, ulcerations which may be located on the neck or elsewhere. Lalouette, in the middle of the last century, had praised in the treatment of scrofula “two livres of solar sulphur, and an antimonial soap by the solar way,” compounds into which gold entered; and later, M. Chrestien, of Montpellier, in his enthusiasm for gold, lauded the virtues of his favorite remedy, not only in scrofula, but also in dartres, goître, scirrhus of the womb, and even tubercular consumption.

The experiments made at the Children's Hospital, by Baudelocque, and at the Charité by Professor Velpeau, in the treatment of scrofula, have only shown the worthlessness of preparations of gold in this affec-

tion. It must be admitted that the treatment of scrofula is generally unsuccessful in our hospitals, as we have had occasion to observe in regard to cod-liver oil. The reason of this is plain. It is admitted by good observers that most of the remedies which possess a real value in scrofula act less as specifics than as stimulant tonics, or special modifiers of the organic apparatus which governs the digestion and nutrition. It follows that these remedies cannot display their powers unless they are aided by pure air, good food, and cleanliness; in a word, by hygienic conditions quite different from those usually found in public establishments.

As regards scrofulous disease in general, gold has certainly come short of the high promises which its patron made in its name. The exaggeration of an enthusiast, however, ought not to throw complete discredit upon a remedy which may have value. It would be unjust to deny that in a certain number of the cases reported in Legrand's last *mémoire* on the treatment of scrofulous diseases of the bones (1851), a manifest improvement has been effected by the preparations of gold in bony scrofula.

Niel, of Marseilles, has observed cases of scrofulous ophthalmia, engorgement of glands, white swelling, tinea, goître, and even elephantiasis, cured by rather large doses of gold.

Next to syphilis, in which it has an incontestable efficacy, the dartres are perhaps the most successful field for the action of gold. Chrestien and Lallemand, of Montpellier, have observed its good effects in leprous diseases (*Bulletin de thérap.*, 1837, t. VII.). In cutaneous diseases, gold is chiefly used topically, though its partisans regard it as useful when taken internally.

Dr. Goetzner has succeeded in cases of ascites, dependent on chronic affections of the liver, in patients who are not exhausted; he gave enormous doses of muriate of gold, from 1 to 5 centigrammes (gr. 0·15—0·77) (Mérat et Delens: "*Dict. de mat. méd.*," t. V., p. 85).

*Diseases of the digestive tract.*—At the beginning of this article we spoke of the property of re-establishing the functions of the stomach which the preparations of gold possess. M. Legrand published a very interesting *mémoire* upon this point, in 1849, containing several accounts of very young children affected with diarrhœa, vomiting, and dyspepsia, and in a state of marasmus which caused serious apprehensions for their lives. In these cases he gave gold in powder, incorporated in honey, from  $2\frac{1}{2}$  to 5 centigrammes (gr. 0·38—0·77) in 30 grammes (nearly  $\frac{5}{8}$  i.) of honey, of which one or two teaspoonfuls are taken daily. He previously quiets pains in the belly, if there are any, by baths, cataplasms, and emollient clysters. He continues the gold till the health is established, and does not fear to give 30, 40 and 50 centigrammes in the course of treatment (gr. 4·5 to 7·5).

*Amenorrhœa.*—Gold produces congestion of the pelvic blood-vessels, and is a powerful means of provoking menstrual or hæmorrhoidal flowing. In this point, gold resembles iodine. It follows that in pregnant women,



or in those who, at the critical period or at any other time, are subject to hæmorrhages, or in those who have a permanent fluxion of the uterus, it may be inconvenient to give preparations of gold, while they will be of advantage if the menses are too abundant or absent.

It remains to speak of gold as a topical agent. Legrand, and afterwards Récamier, used perchloride of gold as a caustic in ulcerations of the neck of the uterus. For washes or vaginal injections, the perchloride of gold and sodium is used in solution in distilled water, in the proportion of 5 parts to 3,000, 6,000 or 12,000 parts of the vehicle. Ointments of gold are of use to cleanse venereal ulcers, and to modify scrofulous and darts ulcers and the various herpetic disorders.

## PLATINUM.

### *Therapeutic Action.*

Hoefer, guided by the chemical analogy between gold and platinum, tried the latter in the treatment of those diseases in which gold and mercury are usually most successful, that is, syphilis and chronic rheumatism. We shall confine ourselves to an analysis of the facts which he reports. He cured several chronic blennorrhagias by the internal use of perchloride of platinum in the dose of 25 milligrammes dissolved in 180 grammes of distilled water, to be taken during one day. In the case of women he also touches the inflamed surfaces with a liniment composed of 2 grammes of perchloride of platinum and 60 grammes of olive oil (gr. 30 and 3 xv.).

In acute blennorrhagia he has had success with urethral injections of a solution of 2 grammes (gr. 30) of double chloride of platinum and sodium in 250 grammes (3 viii.) of distilled water.

The primary chancre has been treated with the platinum lotion described above, with the local application of an ointment composed of 2 grammes of platinum finely subdivided, incorporated with 30 grammes (3 viiss.) of lard.

In syphilitic chancre of the veil of the palate and throat he has succeeded by giving every day pills made by the following formula:

Perchloride of platinum .....	0·6 grammes (gr. 9).
Extract of guaiac.....	4·0      “      (gr. 60).
Powdered licorice.....	q. s. to make 20 pills.

The internal use of chloride of platinum seemed to him of great use in chronic rheumatism.

He remarked that in certain patients under this treatment, there was a considerable increase in the secretion of urine, and sometimes a slight painless salivation without swelling of the gums and tongue. These phenomena gave the patients no discomfort. In respect to the digestion, he thinks that constipation was more frequent than looseness.

During the treatment it is undesirable to subject the patient to a severe and fatiguing regimen. He must, however, during the early inflammatory symptoms, avoid too solid food and too stimulating drink.

He observed none of the ill effects with which mercury is charged, after a treatment with platinum.

The résumé is as follows:

1. The chlorides of platinum are poisons: the perchloride in the dose of 1 gramme (15 gr.), and the double chloride of platinum and sodium in that of 2 grammes (gr. 30).

2. The above salts are less poisonous than the salt of gold and corrosive sublimate.

3. A concentrated solution of perchloride of platinum produces acute itching of the skin, followed by a slight cutaneous eruption at the spot where the application was made. Taken internally, it first irritates the mucous coat of the stomach, causes headache, reacts on the nervous centre, and in this way exercises a peculiar alterative reaction upon the fluids of the system.

4. The double chloride of platinum and sodium produces no local irritation of the skin. Taken inwardly, it does not react upon the nervous centre so sensibly as the simple perchloride. It more particularly increases the urinary secretion.

5. The perchloride is very effective in syphilis, especially in the old, inveterate, constitutional forms.

6. Double chloride of platinum and sodium is more suitable for recent (primary) syphilitic symptoms. It is equally valuable in rheumatic complaints.

7. Platinum must be classed among such alteratives as gold, iodine and arsenic. It differs from mercury by producing a previous excitement and by not producing any of those bad results which are ascribed to mercury. The salts of gold, which seem to be poisonous in much smaller doses than those of platinum, are efficacious (according to authorities) only in certain cases of constitutional syphilis.

8. Platinum is preferable to mercury or gold as an alterative.

We do not, of course, accept all these conclusions of Hoefer's, for a wider experience is necessary in order to confirm them.

## SILVER.

*Diarrhœa.*—Crystallized nitrate of silver has been recommended in several diseases internally. Boerhaave gave it ("libell. de mat. med.") as a drastic purgative in dropsy; in this case  $2\frac{1}{2}$  centigrammes (gr. 0.38) was mixed with the same quantity of nitre and made with bread-crumbs into a pill, to be given every half-hour until the patient begins to be purged. We have advised this in acute dysentery, giving at the same time twice a day an injection with 500 grammes ( $\frac{7}{3}$  xvi.) of distilled



water containing in solution 15—50 centigrammes (gr. 2·3—7·7) of nitrate of silver.

We have long used nitrate of silver very frequently for diseases of the digestive organs. In protracted diarrhœa of nursing infants, if diet, regimen and magnesia, bismuth and powdered oculi cancrorum do not arrest it, we do not hesitate to prescribe nitrate of silver, observing the following rules :

If there are griping pains, and glairy secretions, or glairy tinged with blood, and tenesmus also, we order morning and evening an injection of 250 grammes (  $\frac{5}{8}$  viii.) of distilled water and 5—10 centigrammes (gr. 0·7—1·5) of nitrate of silver, according to the child's age; sometimes after the liquid is expelled we order a fresh injection of lukewarm water to which is added half a drop or a drop of Sydenham's laudanum. These simple means rarely fail to cure with rapidity a diarrhœa which seems to be connected with a phlegmasic condition of the mucous membrane of the colon.

But if the diarrhœa is accompanied by nausea, if the stools are serous, green, lenteric, we do not hesitate to give nitrate of silver by the mouth as follows :

Nitrate of silver.....	0·01 grammes (gr. 0·15).
Distilled water.....	25·00     “     (gr. 385).
Simple syrup.....	15·00     “     (gr. 231).

Of this a quarter, a half or the whole is taken, according to the effect. We give our assurance that this remedy is perfectly innocent, and that there is no reason at all to dread its use internally.

For chronic diarrhœa in adults we give nitrate of silver in pills or potions, in the dose of 5 or 10 centigrammes (gr. 0·77—1·5) daily; if the diarrhœa is due to inflammation of the large intestine, we give injections containing 20 or 30 centigrammes (gr. 3—4·5) of the salt.

In 1840, Hudson published in the *Dublin Journal of Medical Science* an interesting paper on the internal use of nitrate of silver for some affections of the mucous membranes. Osborne previously used it in gastritis with acid vomiting; Langton Parker placed it by the side of bismuth and opium as a sedative of the sensitiveness of the stomach; Bigers and Steinetz recommended it in dyspepsia. Hudson repeated their experiments, and found the salt efficacious in rebellious gastralgia which had entirely baffled other powerful remedies.

We have often found this method useful in refractory gastralgia, especially in neuropathic women with multiple flying neuralgia. In this case we give the nitrate in the dose of 1—3 centigrammes (gr. 0·15—0·45) in pills, taken between meals. These are continued five or six days together; after a certain lapse of time we resume them, according to the result.

As a vermifuge, it is used in the same way (Fodéré: “*Méd. lég.*,” t. IV., p. 163).

*Neuroses.*—Its effect upon the nervous system, quite independently of its irritant effects, cannot be questioned without doubting the veracity of a great number of worthy practitioners.

Nitrate of silver has been one of the most popular remedies for epilepsy. Not that even the twentieth part of those treated have been cured, but that more are cured than by any other method except that by bromide of potassium. As the doses have to be considerable, we begin with 5 milligrammes (gr. 0·08) morning and evening, and increase gradually to 50, 60, 80 centigrammes during the 24 hours (gr. 8—9—12). By this bold use of the remedy many observers have cured cases; the list may be seen in the “*Dictionnaire de thérapeutique*” of MM. Mérat and de Lens, t. I., p. 401. But many others have failed.

While nitrate of silver is powerless against epilepsy in almost all cases, it succeeds more frequently in some less severe neuroses, especially St. Vitus’ dance. M. Bretonneau of Tours has urged this treatment more than any other of our compatriots; but it had been indicated before him (“*Biblioth. méd.*,” t. LI., p. 265; *Journ. gén. de méd.*, t. LXXXVII., p. 290; *Revue méd.*, déc., 1824, p. 445).

In paralysis agitans MM. Charcot and Vulpian obtained no favorable results, as the nitrate only increased the rigidity and tremor. Bouchut claims to have been more successful in general progressive paralysis, but new observations are evidently required, as well as in angina pectoris. In progressive locomotor ataxia the case is otherwise. Wunderlich, six years ago, struck with the good results which he obtained in a form of generalized paralysis which recurred in an hysterical woman after each attack, used it in locomotor ataxia, and in 1861 published five cases, in each of which he had obtained a cure. In France MM. Charcot and Vulpian have been less successful, and none of their patients have been radically cured. Eulenburg states that he was more fortunate last year and obtained one cure.

It has been used in whooping-cough; Berger seems to have found it very serviceable in the acute stage, and when the convulsive symptoms are very marked. He gives it in the dose of 2—5 milligrammes (gr. 0·03 0·08), taken at first three times and afterwards four times daily, if the condition of the alimentary canal permits.

*Paralyses.*—MM. Charcot and Vulpian have some belief in the beneficial action of nitrate of silver in paraplegia with flaccidity of the limbs, and in hysterical paraplegia. In old hemiplegia, flaccidity is rarely seen, but contracture produced by secondary sclerosis is almost always present, in which case silver only increases the contracture and produces twitchings, itching and formication. The preparations of silver are therefore chiefly of use in asthenic paralysis without irritation of the nervous centres.

*Diabetes.*—One of us has improved the condition of a diabetic patient by the internal use of nitrate of silver, in the dose of 5–10 centigrammes (gr. 0·8—1·5) per day, for two weeks.



## SODA.

*Lactation.*—In the treatment of nurses and suckling children, which fell to the lot of one of us at the hospital Necker, we were accustomed to put into all the milk which was given the children half a gramme (gr. 8) of bicarbonate of sodium per litre (quart). This has two advantages: first, it prevents curdling, which easily occurs between the receipt of one day's supply and that of the next; and second, it partly neutralizes the large amount of acid which forms in the alimentary canal of children who are subjected at home—and sometimes in the hospital—to a detestable regimen. Owing to this precaution, diarrhœa, which is so fatal to small children, especially where they are grouped in large numbers, was less common at the hospital Necker than elsewhere. If the diarrhœa persists in spite of these precautions, we find advantage in substituting chalk for bicarbonate of sodium.

*Stomachal vertigo.*—M. Bretonneau, we think, was the first to show positively the influence of certain states of the stomach upon the functions of the brain. He observed that, in a very large number of cases, vertigo, accompanied by trouble of the heart and a tendency to faintness, occurred in persons who at the same time complained of acid eructations; in this case, and even when these eructations do not occur, he gives for five or six days continuously, three times a day, a powder composed of one gramme (gr. 15) of bicarbonate of sodium, and half a gramme of carbonate of magnesium. Then for eight or ten days he orders to be taken after the two meals, half a glass of water, in which 2 grammes (gr. 30) of quassia, cut in small bits, have lain for 24 hours.

*Angina pectoris.*—By accident, the same physician found that a case of this disease was cured after the long-continued use of bicarbonate of sodium. He has since frequently repeated the experiment, and quite generally with success; but in this case he continues the salt for more than a year, and returns to it after an intermission of some months. The dose ought to be considerable—2 to 10 grammes (gr. 30—150) per diem—and in most cases, after he has made a decidedly favorable impression on the disease, he adds to the soda the powdered root of belladonna.

*Dyspepsia.*—A capital fact was discovered by Proust, and confirmed by Tiedemann and Gmelin, to wit: that the empty stomach contains very little gastric juice; that before digestion this liquid is slightly acid and sometimes even neutral, owing to the ingestion of a great deal of saliva; that the gastric juice increases after the ingestion of alimentary substances, and becomes very acid. May not this account for the extreme variability of the results which have followed the use of potassa and soda as lithontriptics, and might not a practical inference be drawn relative to the time and manner of taking them? If given in divided

doses, at distant intervals, and very near a meal, when gastric juice abounds, they will always meet enough hydrochloric acid to be converted into chlorides (Lambossy: "Considérations physico-chimiques relatives à l'absorption des médicaments minéraux;" Thèse, Strasbourg, 22 avril, 1836.) Nevertheless, the analyses of gastric juice which have been made by Claude Bernard and Barreswil inform us that muriatic acid is rarely found free in the stomach; the acidity of gastric juice is chiefly due to lactic acid.

Blondlot and Cl. Bernard, in an important paper, have pointed out the difference in the action of alkaline carbonates, when concentrated and when largely diluted. If bicarbonate of sodium is given in concentrated solution or in crystals, the gastric secretion is suspended; while if greatly diluted, it first saturates the free acids of the stomach, and then produces a very abundant gastric secretion. The use to be made of this fact is evident.

*Plethora*.—Bicarbonate of sodium has of late been very much used in preference to the other alkaline salts, in the treatment, both preservative and curative, of various morbid states, chiefly characterized by the predominance of the stimulant nutritive and plastic elements of the blood. Such a condition is found in the various forms of physiological or morbid plethora, rheumatic and gouty affections, and the whole class of acute inflammations.

There is scarcely a physician who does not daily employ solutions of bicarbonate of sodium, or better, natural Vichy water, to modify the plethoric condition which is caused by too succulent food, want of muscular exercise and intra-visceral combustion, a condition so frequent in rich, sensual and unoccupied persons, especially in large cities. The same remedy is often indicated in persons of the sanguine temperament, who, from hereditary influence or accidental causes, have a more or less marked predisposition to congestions and apoplexy.

In these conditions, bicarbonate of soda is undeniably useful in more than one way, both by removing the embarrassment of the digestive organs which is often connected with plethora, and by modifying the crasis of the blood, and correcting the excess of acids and the predominance of the plastic elements.

By insisting on this alterative treatment, yet always with prudence and reserve, and enjoining the use of a proper rule of living, we may benefit this tendency to plethora and this habit of congestion which, in many persons, forms an incessant danger and a perpetual torment; it is even possible in some cases thus to prevent cerebral hæmorrhage, or at least, to postpone its first attacks or relapses.

In these circumstances, bicarbonate of soda is given in the dose of only one gramme (gr. 15) per day. This is continued for a week or two, and is afterwards gradually increased to 2 (gr. 30) or a little more, with the precaution of suspending its use from time to time, and never making the doses too large.



In the chapter on alterative treatment we mention the importance of the part played by alkaline remedies, especially bicarbonate of sodium, in the treatment of inflammatory diseases. For example, in pneumonia and pleurisy, as well as in acute forms of articular rheumatism, it is certain that alkaline drinks, at the head of which stand the solutions of bicarbonate of sodium, are a very useful auxiliary to bloodletting.

Bicarbonate of sodium has very lately been used in acute pneumonia to the exclusion of all other remedies, and is said to have had success. We find no trouble in believing this, for frank pneumonia is one of those diseases which seem to adapt themselves most readily to many forms of treatment, including the expectant. Nevertheless, in severe cases, it will always be more prudent to put the alkalines in the second place, and not needlessly to compromise them by giving them the precedence over more powerful and approved remedies, such as bloodletting and contra-stimulants.

*Diphtheria.*—Bicarbonate of sodium, as an alterant, seems naturally indicated in diphtheritic affections. It had long been in use for membranous angina and croup, but had never earned such a place by any results obtained. However, it had retained the modest position which it really deserved, down to a recent time, when certain brilliant successes, some real but purely accidental, others doubtful or very questionable, called the attention of the public very loudly to the remedy, and presently, enthusiasm coming to its aid, the carbonate of soda was almost taken for the specific antidote of diphtheria, and even of croup.

Such enthusiasm could not last, and calm reflection and observation soon showed things in their true light. Bicarbonate of sodium has not been given up; but when it is used in membranous angina and croup, it is associated as an auxiliary with other more active remedies. Owing to its alterant and antiplastic action, it may be of use in modifying the general diathesis which seems to preside over the development of the diphtheritic affection, or in acting topically on the false membranes which coat the pharynx or the air-passages, and promoting the softening and detachment of the membranes. In these two ways it may be useful, but it is far from having that excessive importance which had been ascribed to it.

*Gravel, calculi.*—All the alkaline solutions, and especially those charged with bicarbonate of sodium, at the head of which we will put Vichy water, possess the power of rendering the urine alkaline very rapidly. This property led to the idea of dissolving vesical concretions or calculi. Magendie is perhaps one of the first who expressed this idea and urged physicians to make the experiment.

This method of dissolving calculi had been long known, if not expressly formulated by science. The many remedies called lithontriptics, such as snail-shells, recommended by Pliny, the famous specific of Miss Stephens, Saunders' potion, the remedy of Juride and Chittiks, the ptisan of Mascagni, etc., all these have carbonates of sodium or potassium for their base, and their unquestionable success is due to the fact of their alkalinity.

Guided by these empirical facts, and by more recent and decided observations and experiments, due to such eminent chemists as Arcet and Berzelius, a certain number of physicians responded to Magendie's appeal, and by experiment established the positive solvent efficacy of alkaline solutions or waters, whether given in drink or as baths, or as injections.

The leader of these experiments was Dr. Petit, inspector of the waters at Vichy, who concluded that those waters "act not only by increasing the secretion of urine, and thus facilitating the discharge of calculi, but that their essential and most pronounced action depends on a communication of their chemical properties to the urine, which is thereby enabled to dissolve and disaggregate the calculi, as far as their volume and chemical composition permit it."

To explain the destruction of a great number of calculi upon which the alkaline salt has no direct chemical action, M. Petit brings forward the following consideration: "Too much attention cannot be given to the vesical mucus, which mingles with the calculous matter, is interposed between its particles, increases their adhesive force, and, in a word, acts like a cement. The calculus, therefore, contains a sort of agglutination of animal and saline substances. The waters dissolve the saline part, which, deprived of its cement, is deposited in little lamellæ and is ejected with the urine; thus they may act on phosphatic calculi, especially those composed of ammoniaco-magnesian phosphate, almost as effectively as on uric acid." He infers that, even when the waters do not chemically act upon the elements of a calculus, whatever its composition, they may by disintegrating the components diminish them by degrees, and cause their natural expulsion from the bladder.

This claim on behalf of the Vichy waters, that they act upon all calculous concretions without exception, has necessarily met with much contradiction. Some have denied the truth of the facts, that is, of the solution of the calculi, whatever their composition; in proof of which they offered direct experiments in which calculi, exposed to contact with Vichy water in or out of the bladder, underwent no diminution in weight or alteration in texture. Others, and the more numerous party, while admitting in general the favorable action of the waters in certain calculous affections, especially gravel, opposed, and with good reason, the too exclusively chemical explanation which was offered.

Passing over the exaggerations and the false explanations, to which time has done justice, we can say that the Vichy water has gained its cause; and no one can now question the efficacy of alkaline waters, especially those of Vichy, in gravel—an efficacy attested by cures, to which most physicians can bear witness.

There is, however, a distinction to be made between the different kinds of gravel. They may be divided into two chief groups: 1, those due to uric acid and its compounds; 2, those caused by phosphatic deposits.

The value of alkaline solutions in uric acid (red) gravel, the only kind



which is caused by a true diathesis, is almost universally admitted. Experience has shown very positively that the use of alkaline salts, and particularly, a season or several seasons at the Vichy Springs, favor the expulsion of the gravel and seem to assist in preventing new formations for some time.

But this unanimity is not found in regard to phosphatic gravel, the white variety. In the latter case the urine loses its acidity and becomes neutral or alkaline. At first view, the chemical theory seems to forbid the use of alkaline waters; and we know that savants of the first rank, including Marcet and Prout, have made objections, apparently of great force and justice, to this remedy. But other chemists, not less distinguished, particularly M. Mialhe, have attempted to bring equally convincing arguments on the other side.

We shall leave the chemical question to the chemists, and confine ourselves to observation and clinical facts. If, on consulting the facts, we find that the alkaline treatment does not possess in phosphatic gravel the same evident efficacy which it displays in uric acid gravel, we think, nevertheless, that it does render valuable service in the former cases.

Phosphatic gravel does not depend upon any general state of the system, as does uric acid gravel; it is a purely local affection, usually seated in the bladder. It is almost always due to a catarrh of that organ; in which case the urine is retained by an obstacle to its free passage, and becomes subject to an ammoniacal decomposition.

Not to speak of the chemical reactions, which are said by some authors to exercise in this case a local action very advantageous in the affection of the bladder, there are yet other facts which seem to speak in favor of Vichy water. It is said that large quantities of mineral water, introduced into the system, cause a continual renewal and increase of the urinary secretion, dissolving purulent mucosity, modifying beneficially diseased surfaces, arresting the formation of ammoniacal products; and that in this way we remove by degrees the cause of the deposit, and the precipitation, and attack the disease at its source.

In brief, it is by an almost identical action, that is, by the introduction of a large quantity of carbonate of soda into the system, that Vichy water is useful in most affections of the urinary passages which are characterized by gravel or calculous concretions. While modifying the pathological state of the vesical mucous membrane and liquefying the mucus, it also acts on the composition of the blood, preventing the formation of uric acid or neutral phosphates, and thus changing the constitution of the urinary principles so that on reaching the kidneys and bladder they no longer contain insoluble substances adapted to form precipitates (*Extract from a notice of the Vichy waters, 1854*).

In this method of stating the action of alkalines upon affections of the urinary passages, which seems to express the present leading opinion among the physicians of Vichy, we are glad to see that there remains something which is not reduced (as in the past) to a purely chemical

action; that the success of the treatment tends to be referred, at least in a very large share, to the physiological influence exercised by the treatment, both upon the system and upon the diseased organs.

Can a real and durable cure be conceived of as effected without a general and profound modification of the whole system—an action of the remedy upon the morbid diathesis, when the latter is universally recognized as the true cause of the disease?

In other words, how else can we interpret the remarkable and constant fact, that persons who have taken alkaline waters for several months, and who have been relieved of gravel while taking them, remain for several months and years without forming new gravel, after ceasing to use the alkali? In this case, are we not absolutely forced to admit that under the alkaline treatment not only does the urine, ceasing to be acid, become unable to form new calculi, but that the remedy has modified the kidneys, or the digestive organs, or the whole economy, so that the entire diathesis, in a word, if not destroyed to its foundation, is at least restricted in its manifestations?

*Gout.*—In the chapter on alterative treatment we shall speak of the nature of the curative action of alkaline drinks, and especially of Vichy water, in gout. The physicians at Vichy are not agreed upon this point. Our own experience has been as follows:

The disease is very rarely cured radically by this treatment; we may even say that, in the case of hereditary and strongly constitutional gout, the remedy is usually impotent.

But we cannot deny that in cases of simple regular gout, its effects are more marked; the frequency, the duration, and the intensity of the attacks are usually lessened, and sometimes the local accidents are caused to disappear. Though it usually has but little action on nodes and other tophaceous concretions about the joints, it nevertheless easily resolves, to some extent at least, the engorgements which proceed from rigidity of the ligaments and contraction of muscles.

To tell the truth, Vichy water in a good many cases produces an immediate aggravation of symptoms, or various accidents after a lapse of time. The bad results are chiefly found in abnormal and irregular gout, especially in the atonic form. And to be frank, we have good reason to think that the Vichy waters have repeatedly caused metastases, which have proved fatal.

We need not repeat what has been said above as to the danger of the abuse or the untimely use of alkalines.

In the treatment of gravel, the sesquicarbonate or bicarbonate of sodium is given for two or three months in the dose of from 2 to 30 grammes per day (gr. 30—450), in one, two, or three quarts of water.

*Diabetes.*—The utility of alkalines in diabetes was known in the last century. Lime-water was then prescribed as a means of relieving the excessive thirst and diminishing the renal secretion. Veterinarians were very successful in curing a disease of horses called *la pisse*, by giving Spanish



white mixed with water. At present, an infinite variety of alkalines is given; carbonate of lime, bicarbonate of sodium, magnesia, etc. But these remedies do not act in the system as they do upon sugar in the test-tube. They act as powerful modifiers of nutrition, placing the patient in special conditions, by virtue of which the abnormal production of sugar ceases to occur. We should not seek to produce absolute alkalization; these remedies must be given simply as adjuvants, in moderate dose, and only for a certain time, eight or ten days in each month, and no more.

*Aphthæ*.—Professor Gubler has shown that the presence of aphthæ is connected with suppression or great diminution of the saliva with partial dryness of the mouth and collection of the products of epithelial desquamation, to which are added fermentable alimentary substances. Acidity of the mouth commonly denotes the presence of spores in the mucus, and indicates that clusters of *oidium albicans* are about to appear. Gubler deduces the rational rule, that all alkalines cure aphthæ; he usually employs bicarbonate of sodium.

#### BORAX OR BIBORATE OF SODIUM.

*Stomatitis and angina*.—Borax is chiefly used as a wash, by mixing it with equal parts of honey, or in the proportion of a fourth, an eighth, a twelfth; it is recommended in foul ulcers of the gums, of the inner aspect of the cheeks, in thrush, and pultaceous angina (Bisset, Gooch, Veryst, Starke, Gmelin, "Apparat med.," continuation of Murray, Baup, de Hyon, "Bibliothèque de Genève," t. XL.: Récamier, "Leçons cliniques de la faculté de médecine de Paris"). In cases of laryngeal catarrh we prefer syrup of borax to gargles, especially for children. It is given by teaspoonfuls eight or ten times a day, with the precaution of not drinking immediately afterwards, in order to prolong the contact of the salt with the affected mucous membrane.

In angina, aphthæ, thrush in children or even in adults, it is often sufficient to use it in a wash, sometimes with the addition of opium in cases of stomatitis and that painful angina which attends fatal cachexiæ (phthisis, cancer, cirrhosis, etc.).

*Pruritus of the mucous membranes and the skin*.—In vaginal injections it is useful for leucorrhœa caused by a slight erosion of the os tincæ; and in pruritus of the male and female genitals (Dewees: *Bibliothèque médicale*, t. LXIV., p. 136).

In certain very irritable persons it is a good substitute for sulphate of zinc or copper in collyria, calming the erethism of the conjunctiva, and acting with sufficient energy as a styptic.

Hufeland and Récamier have brought it into repute in our times. Hufeland, and after him Reinard, following Starke (see Gmelin, l. c.), order it dissolved in water or mixed with various mucilages for the treatment of dry superficial diseases of the skin accompanied by a very pain-

ful feeling of itching and burning, such as facial eruptions, and frost-bites. (*Journal de chimie médicale*, t. II., p. 591; *Archives générales de médecine*, t. XVI., p. 137).

Borax given internally, has a certain lithontriptic value in uric acid gravel and calculi, by virtue of its alkalinity, and independently of its sedative effect.

*Dysmenorrhœa.—Accouchement.*—The compiler Gmelin calls attention (l. c.) to another property upon which he quotes a great many authorities. This is its power of assisting menstruation, of quieting the uterine pains which accompany or precede the function, and even those which appear during parturition; of producing the lochial discharge, etc. It is probable that borax owes these qualities to the soda it contains; as to its special action on the uterus during parturition, we shall wait for more evidence. Hufeland (*Journal d' Hufeland*), Lobstein (of Strasburg) (*Journal de médecine*, de Leroux, t. XXXVI., p. 107), Van Krassendonck (*Bulletin des sciences médicales de Ferrussac*, t. XI., p. 275), also recommend it for rendering the labor-pains regular and for reviving the uterine contractions; but Duchâteau, who used it for the same purpose and in the same doses, states that he derived no benefit from it (*Société d'émulation*, novembre, 1876).

We must add that Dr. Spengler of Ems has more recently sought to define more precisely the indications for this medicine. He believes that borax is of especial use when the woman is suffering from exaltation of sensibility, where there exists a spasmodic condition of the uterus which opposes the act of parturition, and is accompanied with cramps and pains. If this be so, borax is indicated in conditions precisely the reverse of those where ergot of rye is demanded. The internal dose is from 2 to 4 grammes (gr. 30—60).

## LIME.

*Acescence, pyrosis, acid dyspepsia.—Infantile diarrhœa.*—For the first six months of life, the fluids of the infant's mouth are normally acid; and the stools are also often acid, especially when they have that greenish tint which so often replaces the normal yellow. This green color is due to a blue substance, which often appears as such on the diaper, and, with the yellow color of the fæces, forms a green of varying depth. When the alteration is slight, the blue color is not produced until several hours after the fæces are expelled, and appears first upon the diaper, afterwards on the parts of the fæces that are exposed to the air. But when the alteration is greater, the entire mass is affected, and the color appears shortly after defecation, or before, and the fæces, as passed, are of a very strong green, almost blue.

This acescence, often associated with diarrhœa and erythema of the buttocks and thighs, is remarkably benefited by mixing lime-water with



the milk in the proportion of a fourth, or by giving it in sweetened water, if the child is at the breast.

In the adult, the buccal mucus, mixed with saliva, generally has an alkaline reaction, and the acidity of the mouth, when it exists, almost always accompanies that of the stomach.

The painful acidity or burning sensation at the stomach, pyrosis, is not produced by an excess of gastric juice, but by the acids which are formed at the close of the fermentation of starchy matters, wine, and alcoholic liquors. The acid regurgitation occurring long after eating, when the starchy substances are not digested, may have been rightly interpreted by Galen; for he says that it occurs when there is an acid corruption of the food in the stomach.

This affection is remarkably improved by alkalines, and in particular by lime given under the form of mineral lime-water, or of pastilles containing tribasic phosphate of lime. M. Delpech has made tablets of the gelatinous tribasic phosphate with gum tragacanth, which gives the best results.

Lime is the best of all alkalines, if there is diarrhœa; but if there is constipation, preparations containing soda or potassa should be preferred.

To young children suffering from acidity, with vomiting and diarrhœa, we may give powdered oculi canerorum, in the dose of 0·2—0·6 (gr. 3—9); for adults the usual dose is 4 grammes (3 i.).

*Diarrhœa.*—In chronic diarrhœa, in those due to ulceration of the intestine, more particularly the large intestine, lime-water, used as a drink or an injection, has been used; Bretonneau, of Tours, has praised its effect in the diarrhœa which retards convalescence from dothineritis and dysentery. In the former disease he used to give lime-water, from 30 to 60 grammes a day shaken with warm sweetened milk; in dysentery he used it in the same way, at the same time ordering a whole injection morning and evening, which contained from 120 to 200 grammes (3 iv.—vi.) of lime-water, and 3 or 4 drops of Rousseau's laudanum.

*Phthisis.*—M. J. Guyot, having a phthisical patient at the hospital St. Antoine, who had used phosphate of lime to arrest night-sweats, continued to use the medicine, and applied it to many other similar cases. In a few it failed; in a greater number the sweats lessened or disappeared. M. Guyot in some cases was able to suppress and to restore the sweats with certainty by giving or withholding the phosphate of lime. The dose varied from 2 to 6 grammes per day (*Bulletin de thérapeutique*, 1870, t. I., p. 140).

Dr. Beneke, of London, recommends phosphate of lime in phthisical diarrhœa. We often use the following formula of Frémy's in consumption:

Hypophosphite of lime.....	12 grammes (3 iii.).
Ammonio-citrate of iron.....	8        “        (3 ii.).
Cinnamon powder.....	} q. s. for 24 powders.
Benzoin.....	

*Rachitism.—Osteomalacia.*—Phosphate of lime was recommended for rachitism in 1793, by Bonhomme, of Amiens, but was not adopted in regular practice, in spite of the praise of Hallé, and the experiments of Chossat. In 1844 Piorry took up the remedy, thinking, like his predecessors, that he could deposit phosphate of lime in the bones where it was wanted. He prescribed the powder of scraped bones. In 1852 M. Mouriès improved on this, by giving the phosphate in small doses mixed with an albuminoid matter, which, unfortunately, is too often acid. The remedy has been twice abandoned: it has been tried for a third time, but will probably soon be given up once more.

The latest experiments are as follows :

We know that the bones are liable to changes which produce softening, deformity and fragility. These changes may occur in infancy, constituting rachitism; in adult life they are called osteomalacia, and in old age, senile osteomalacia. Nevertheless, there is more than a simple question of age; the affection in infancy differs from the softening of adults, and the latter does not resemble that of old men. The microscopical lesions of rachitism are not absolutely the same as in osteomalacia; they proceed from arrested development, while the affection in the adult is a real atrophy, or rather, as is now said, a detrophy. It is possible that this detrophy may be found not to be a primary affection, but the common element in determinable pathological conditions.

As to the senile atrophy which causes fractures or deformity of the bones, it is a well-known affection of old age, in animals as well as in man, in regard to which the most complete information may be found in the thèse of Paul Bouley (Paris, 1874).

In animals, osteomalacia has always been produced by the same cause—an excessively dry summer, which makes the fodder poor in important minerals. Phosphate of lime has been given in all forms to these animals without satisfactory results; while they have been completely cured by transferring them to places where the forage was richer.

We will say as much of rachitism; it is much easier to cure it by rich food than by phosphate of lime. Rachitism and osteomalacia are no more cured by phosphate of lime, than anæmia is by drinking blood, or neuroses by eating brain.

It does not, however, follow that lime should not be given to such patients. We can say here what we said of iron. The preparations of lime are much more efficient by their action upon the digestive tract than by their transportation in substance to the bones.

The preparations which we have found most efficient in rachitism and osteomalacia are lime-water and saccharate of lime. Food may be taken which contains much phosphate of lime, as army-bread (containing a certain amount of bran), and beans and haricots.

*Fractures.*—M. Alphonse Milne-Edwards supposed that by the addition of a certain quantity of phosphate of lime to the diet a portion might be fixed in the callus. He gave it to wounded persons under the care of



M. Gosselin, and to animals, as rabbits, in whom he had produced fractures. His conclusion is, that he accelerated the ossification of the callus, and that the treatment might obviate to some extent the danger of non-consolidation (*Bulletin de thérapeutique*, 1856). The practice was taken up by M. Fano (*Union médicale*, 1859, t. III., p. 24), but has since fallen into disuse.

*Lymphatism.*—M. Mouriès states that phosphate of lime plays a more important part in animals than has hitherto been supposed. Independently of its influence upon ossification, the salt has a special action upon irritability, without which neither assimilation nor nutrition could take place. An extreme deficiency of this principle produces death with all the symptoms of inanition, and a deficiency in a less degree produces numerous affections which are connected with lymphatism. M. Mouriès, by his examinations and analyses, has been led to the conclusion that the food of the inhabitants of cities is usually defective in this point, the daily quantity consumed by women in cities being less than half that which is needful (6 grammes or 3 iss.) to the economy. As a consequence, he shows that the milk of nurses in cities is poor in fixed salts, and particularly in phosphate of lime. Hence, the foetus and the young infant must suffer considerably from the absence of a substance which is indispensable to their existence and development. This is one of the chief causes of the enormous excess in the number of still-born children, of the prevalence of so many diseases among infants, and their very great mortality in large cities.

To remedy this evil, M. Mouriès proposes to add to the diet of pregnant women, wet-nurses and infants, the nutritive principle which is deficient. It is his plan to associate phosphate of lime with an albuminous substance; and he has prepared a kind of fine bread or paste, which is to be given in soup to nurses or mothers or children, whenever there is reason to think that the phosphate of lime is deficient in the food or the milk, or whenever the child's health seems to require it.

In support of these wholly theoretic considerations he presents a certain number of cases in which this kind of food is said to have lessened the number of still-births in certain families, to have diminished the number of lymphatic diseases in children, and even to have aided in curing them when not prevented. Among the affections akin to lymphatism which may be thus benefited, he names debility from birth, rachitis, deviation of the spine, deformity of the bones, retarded dentition, and slow growth.

These ideas have supporters abroad. Dr. Beneke, physician to the Dalston German hospital in London, published a paper in the *Lancet* of April 19, 1851, which tends to the same conclusions: he points out the importance of phosphate of lime in growth, and regards scrofulous patients as deficient in this salt. Hence he has treated ulcerous scrofulidæ by the internal administration of lime, and claims great success.

## BARYTA.

Chloride of barium has for some years enjoyed a certain reputation in the treatment of white swellings. Crawford, in 1780, was the first to recognize its good effect in scrofula. More lately, Professor Scassi of Genoa, has made investigations, and since then, in Italy, MM. Mojon, Nongiardini, Ferrari, etc., have had good results, while in France, at the instigation of Pirondi, the Italian experiments have been repeated at La Pitié by Lisfranc, with incontestable success.

The mode of administration is as follows:

Lisfranc usually began with a mixture of 30 centigrammes (gr.  $4\frac{1}{2}$ ) in 125 grammes (say 4 oz.) of distilled water, of which the patient took a tablespoonful every hour, except an hour before and two hours after meals. The patient, in order to endure this medicine, must abstain from wine and flesh, and confine himself to pure water and vegetable diet. At the end of a week, if no accidents occur, he doubles the quantity of the salt in the same amount of water, and thus continues to increase gradually, giving in some cases as much as 3 grammes (gr. 45).

The unpleasant symptoms which may oblige the patient to suspend the use of the remedy for some days, consist of pain about the stomach, nausea, vomiting, etc. These first symptoms of poisoning are readily dissipated by the white of an egg, or by sugared wine, as M. Pirondi has advised (*Bulletin de therap.*, t. X., 11e livraison).

## LITHIA.

*Gravel.*—Garrod claims to have established the action of carbonate of lithium when given internally. He has used it several years, in cases of uric acid diathesis connected with gravel, and in chronic gout, and has always obtained the most satisfactory results. Taken internally, twice or three times a day in the dose of from one to four grains dissolved in water, it produces no direct physiological action; but in persons who pass uric acid gravel, it has a marked influence by lessening the amount of the deposits, or arresting them entirely. As there have never been any bad consequences, Garrod considers this remedy the most suitable to drive away attacks of gout and improve the patient's condition.

*Gout.*—Carbonate of lithium is by no means destined to replace colchicum. Its use is in chronic gout. It is valuable for preventing the return of attacks, and for dispersing the remnants of the disorder. In certain cases it has caused old nodules to disappear which were supposed incurable.

M. Charcot quotes in particular ("Garrod on Gout," p. 490) the case



of a woman aged 77, who had been treated for tophus, at Wiesbaden, without success, and afterwards used the following drink:

Carbonic-acid water.....	500 grm. = $\frac{7}{3}$ xvi.
Bicarbonate of sodium .....	0.25 grm. = gr. iv.
Carbonate of lithium.....	0.10 “ = gr. iss.

The concretions were said to have disappeared in two weeks. Charcot does not guarantee the fact, given by Stricker, and we understand him; but as he thinks it worthy of mention, we follow his example in desiring physicians to try this remedy, which, if it do not disperse the tophus, will produce no bad effect (“Garrod on Gout,” etc.).

Ure has proposed to inject carbonate of lithium into the bladder to dissolve urinary calculi.

### AMMONIA.

*Spasmodic diseases.*—Cullen regarded ammonia as the best antispasmodic. M. Levrat-Perroton has praised its effect in whooping-cough. It has been recommended in cases of migraine, in doses of 5 or 6 drops in an infusion of tilia or orange-leaves. Dr. Baraillier, of Toulon, states that in attacks of nervous headache, muriate of ammonium relieves almost instantly; he gives 3 grammes (gr. 45) in 3 doses, in solution, with half an hour's interval between the doses. We shall not speak of the advantages of ammonia in paralysis. It is too evident that we cannot attach great confidence to what Bichat says upon this point, according to Jahan de la Chesne (*Journ. de méd.*, t. XIX., p. 260). Fournier Pescay and François d'Auxerre regarded it as the most trustworthy remedy in tetanus (“*Dict. des sciences méd.*,” t. LV., p. 31); the dose in this case should be large, and may be as much as 15 grammes (in divided doses) per day [gr. 230].

M. Martinet believed that an epileptic patient might prevent an attack from coming on, if he swallowed a draught containing ammonia during the initial symptoms.

*Diabetes.*—In speaking of soda and potassa we stated that they had been used for their alkaline properties in the treatment of diabetes mellitus. Certain physicians, struck with the dryness of the skin of diabetic patients, and hoping to produce sweating by ammonia or its carbonate, gave it as a sudorific; they observed an improvement which they attributed to the diaphoretic action of the remedy, but which ought rather to have been attributed to its alkaline properties.

Hodges (*London Med. Gaz.*) quotes the case of a young girl of seventeen, extremely diabetic, who passed 12 litres (quarts) of urine, in 24 hours. He first gave 25 centigrammes of carbonate of ammonium every three hours, confining the patient to the use of coffee, bacon, meat, and vegetables without sugar. The disease was improved in four days, and cured in two months and a half.

Barlow has a theory which approaches the truth. He thinks (and is the only one who has the belief) that the increase of urine is caused by the diuretic effect of the sugar, that is, its excitant action upon the kidneys. He prescribes the sesquicarbonate in the dose of 25—30 centigrammes (gr. 4—5) or more, with a few drops of tincture of opium in a bitter infusion, to be repeated every six hours; the diet to be animal, with antiscorbutic plants. He reports four cases in support of this treatment, but carefully states that he is far from offering the method as one which must succeed in all cases (*British and Foreign Med. Review*, Oct., 1841).

*Pneumatosis*.—The neutralizing action of ammonia has been employed very successfully by veterinarians in case of gaseous distention of the paunch in ruminants (*Bulletin des sc. méd. de Férussac*, mai, 1826). The animal takes a drench containing a large quantity of ammonia, which unites with the carbonic acid gas that distends the stomach, relieves the meteorism at once, and arrests the fermentation of the mass of food. This plan ought to be adopted for the treatment of persons; it is stated by chemists that carbonic acid forms a large part of the gases which are naturally or accidentally developed in the digestive passages. The value of such draughts or injections is easily seen in certain cases of meteorism.

*Acidity*.—Ammonia acts in the same way in the treatment of poisoning by acids, and in that of acidity of the stomach; the formula advised by Chevallier in the latter case is the following: Distilled water, 150 grammes (about  $\frac{5}{8}$  v.); water distilled from mint, 15 grammes (gr. 230); ammonia, 3 drops; to be taken in one or two parts (*Journal des connaissances méd.-chir.*, t. I., p. 342).

*Alcoholism*.—In poisoning by alcohol and animal venoms the virtues of the volatile alkali have been exaggerated in the most ridiculous, not to say the most mendacious manner. In slight intoxication, as is shown by the observations of Girard and Chevallier (*Revue médicale*, nov., 1823), and Piazza (*Bull. de thérap.*, t. VII., 1834), a dose of 15 or 20 drops of ammonia in a glass of sweetened water is useful, though Chantourelle brings facts upon the opposite side; but when intoxication is profound, the alkali is insufficient. Nevertheless, we ought to say that M. Rigal (*Arch. gén. de méd.*, t. XVII., p. 601), gives an account of a beggar, dead-drunk, who could not be restored except by giving him 8 drops, and afterwards 4 drops of ammonia.

M. Tessier of Lyons, who has great confidence in ammonia, and considers it one of our best alexipharmaca, claims to have used it with benefit in certain permanent lesions resulting from the abuse of alcoholic drinks, as amblyopia, and in diseases caused by the emanations of tobacco-leaves.

M. Scharn, after trying in vain all the remedies which have been recommended for the chorea of drunkards, conceived the idea that this disease, being merely drunkenness at its apogee, ought to be treated by the remedies which are successful in the latter, and that, consequently, ammonia



ought to be perfectly adapted to all the requirements of such cases. With this evidently false idea in his mind, he has ordered for delirium tremens the liqueur ammoniacale pyro-huileuse [crude ammonia], or more simply, succinate of ammonium; by which simple means he says he has seen the severest symptoms, the most furious delirium, conquered as by enchantment after a few hours, without any other remedy. Brachet of Lyons has more recently praised ammonia in the dose of 15 drops in a glass of water in delirium tremens (Casper's *Wochenschrift*).

*Poisoning by hydrocyanic acid.*—Our last remarks are applicable to poisoning by hydrocyanic acid. We have been witnesses of the experiments of Dupuy at Alfort, intended to show the value of volatile alkali and of carbonate of ammonium in the treatment of this kind of poisoning. We can state that a horse, poisoned by 36 drops of Scheele's prussic acid, recovered spontaneously in two hours; and that the same horse, similarly poisoned the next day, and treated in a quarter of an hour by the carbonate of ammonium, recovered as before, but remained longer sick; and yet this singular fact, the most important circumstances of which were omitted in the telling, produced the same impression as that of Bernard de Jussieu, and ammonia was regarded as the antidote of hydrocyanic acid as truly as of the poisons of the viper, scorpion, bee, etc.

The principal compounds of ammonia used in medicine are: the carbonate, the acetate, and the muriate.

### CARBONATE OF AMMONIUM.

This salt is strongly alkaline, and owes its medical virtues entirely to ammonia; we do not ascribe to it any special virtues. The dose is twice as large as that of ammonia.

In England it is used in syncope and epilepsy, being inhaled, with precaution, from a wide-mouthed vial. Various aromatic essences are added to the salt.

Peyrilhe, and after him Bielt, obtained favorable results from the use of the subcarbonate in certain inveterate forms of syphilis, especially the syphilidæ. M. Cazenave, imitating them, proposes the drug as a substitute for the preparations of arsenic in certain squamous affections, such as psoriasis and lepra vulgaris. He gives each day from one to three large spoonfuls of the following mixture: subcarbonate of ammonium, 2 grammes (gr. 30); sudorific syrup of the Codex, 200 grammes (about  $\frac{5}{3}$  viss.). After from three to eight days the scales fall off, and the fresh scales become more and more light and thin; the plaques on which they rest waste, the redness is extinguished; and at last the cure is complete, and often permanent ("Annales des mal. de la peau," oct., 1851).

M. Guérard has revived the use of this salt in acute and chronic pulmonary catarrh; his dose is 1 or 2 grammes (gr. 15—30) in a draught.

## ACETATE OF AMMONIUM.

What we have just said of carbonate of ammonium may be applied to the acetate. But we cannot pass without referring to what Boerhaave, Cullen, Selle and so many others say of spiritus Mindereri. These writers, and our own contemporaries, agree in ascribing to acetate of ammonium the property of making the circulation, the secretions, etc., more active—a property which it shares with the volatile alkali (Cullen: “*Mat. med.*,” t. II., p. 366; Selle, “*Obs. de méd.*,” p. 70). As regards the effect upon intoxication (Mazuyer: *Gazette de santé*, nov., 1826), migraine (*Ibid.*), and the uterine pains which accompany menstruation, it has no special property beyond what was stated under ammonia. But the acetate of ammonium has lately been used in a more special way as a uterine sedative. M. Patin has reported cases which tend to show that in excessive or too frequent menstruation, or uterine hæmorrhages, even if proceeding from cancer, this remedy diminishes the amount and frequency of the discharge. It is then given in the amount of 15 grammes in the 24 hours, in 4 doses. The same physician says that acetate of ammonia has often succeeded in his hands with cases of difficult and painful menstruation, causing the pain to cease and assisting the flow. From 50 to 75 drops may be given, divided into two doses and mixed with a glass of sweetened water. As soon as the pains and disturbances of the menstrual period appear, the first dose is given, and the second, if necessary, half an hour later. The amount may be increased according to the severity of the symptoms.

He also reports a case of nymphomania very beneficially treated by this remedy. He adds the inference, that acetate of ammonium might be very useful to women disposed to abortion owing to determinations of blood to the uterus; in inflammations of the uterus and ovaries, and in organic lesions of the same parts (*Arch. gén. de méd.*, t. XVIII., p. 217).

## MURIATE OF AMMONIUM.

This compound has no special virtue distinct from that of the others, as may be seen by referring to Frederick Hoffmann's and Arnold's remarks on its influence on the pulmonary secretion (*Journal complémentaire*, t. XXVI., p. 300), Kortunn's and Kuntzmann's on its efficacy in rheumatism, etc. We shall only say that it was formerly much used in the treatment of intermittent fevers (Stoll), but usually in conjunction with cinchona or some bitter.

Nevertheless, we will not omit the use made of it by Dr. Fischer in spasmodic dysphagia. He gives a dose of 125 centigrammes (gr. 20) every two hours, and in the case reported by him it was continued for eleven weeks (*Arch. gén. de méd.*, t. II., p. 118).



*Bronchitis*.—Muriate of ammonia has a very high reputation in Germany as a resolvent in chronic bronchitis.

Dr. Delvaux, of Brussels, says that he has found it very useful in the dose of from 1 to 3 grammes (gr. 15—45) in the 24 hours. It usually causes a great sweating, and abundant urine; while the dyspnœa diminishes, the cough becomes less fatiguing, the expectoration easier and less abundant, and the appetite soon reappears (*Journal de Bruxelles*, 1854).

M. Marotte speaks well of its effects when substituted for sulphate of quinia in catarrhal affections. He sums up his results as follows:

In the immense majority of cases, catarrhal affections affect a periodicity, taking the type of continued remittents or intermittents, quotidian, double tertians or hemitrits. This has been known from their earliest history, and has no novelty. Nor is there anything new in the comparison which has been made with paludal diseases.

The observation of the causes under which they develop is sufficient to prevent confounding them with the latter. These special causes explain why catarrhal affections, although usually controlled by cinchona, and especially by sulphate of quinia, on account of their periodicity, are not so absolutely nor so easily controlled by it as affections of paludal origin. They may give to catarrhal affections a character of tenacity and fixity which sometimes makes their course continuous, and resistant to quinia, even when they seem to be periodic. This is fully proved by the history of "medical constitutions" [*i. e.* epidemic conditions] and of general epidemics.

There is no uniform specific treatment for catarrhal affections; they are cured by obeying the indications as they arise.

The present epidemic (1867) proves that catarrhal affections may be made less tractable, or wholly intractable, to sulphate of quinia, by an inflammatory erethism, which doubtless originates from the general preponderance of cold in the midst of other conditions suitable to engender it.

Whatever may be the value of this morbid determination and of this indication for sal ammoniac, and whatever the results of further observation, it follows from facts observed in the present state of constitutions, that muriate of ammonium may become a useful substitute for sulphate of quinia in catarrhal affections. (*Académie de médecine*, avril, 1867).

*Senile gangrene*.—A woman aged eighty-three was suddenly seized with intolerable pain in the right foot; eighty-four hours later, there was a general blue-blackish tint, stopping at the tibio-tarsal joint, where a red stripe indicated the demarcation. The foot was perfectly cold. Dr. Gru at first used preparations of opium in enormous doses, but the pains continued and the patient seemed in despair. He then put 250 grammes ( $\frac{7}{8}$  viii.) of muriate of ammonium in a foot-bath reaching to the malleoli, and plunged the affected foot in it. In two hours there was considerable relief. The bath was then replaced by fomentations with the same solution, and the patient insisted on their retention, for, as often as they were taken off, the pain reappeared directly. The normal warmth

and color soon returned under this influence, the nail of the second toe fell off, and a small sore was formed which healed in three weeks.

A year later, the same precursory signs appeared in the same foot. This time, muriate of ammonium was used at once, and its sedative properties were felt immediately. A blackish blister appeared on the outer border of the foot, covering a gangrenous patch which fell off, and the sore healed in twenty-one days. No further trouble of the sort has since occurred.

This action has never before been mentioned; let us hope that it will be confirmed by fresh cases (*Bulletin médical de l'Aisne* and *Gazette des hôpitaux*, 15 juin, 1867).

*Articular rheumatism.*—M. Dujardin-Beaumetz, having sought to introduce the hydrochlorate of trimethylamin in the treatment of this disease, desired to see if the muriate of ammonium, which closely resembles it in chemical composition, had similar properties. His experiments on the guinea-pig, rabbit, and frog, showed him that muriate of ammonium injected into the subcutaneous cellular tissue of these animals produced convulsive shocks and speedy death; the muriate of trimethylamin appearing much less poisonous. These experiments are not very applicable to therapeutics; they may serve to warn physicians of the danger of such injections, but have no bearing upon the administration of the salt by the mouth; in fact, a dose of ten grammes (3 iiss.) of the salt of ammonia thus given has produced no such result (*Société de thérapeutique*, 14 mai, 1873).

M. Martineau has used muriate of ammonium in the dose of  $\frac{1}{2}$  gramme daily in solution in a julep, for cases of acute articular rheumatism. The 14 patients thus treated seemed to him to recover as quickly as with muriate of trimethylamin. M. Delioux de Savignac objects to these optimistic conclusions, that half a gramme (gr. 8) is a very small dose of a drug which is constantly given in doses of 60 grains and upwards. It is to be feared that the real result is not so favorable as M. Martineau seems to think.

#### PHOSPHATE OF AMMONIUM.

This salt has been recommended by Buckler, of Baltimore, as very efficacious in gout, rheumatism, and all acute or chronic diseases depending on the uric acid diathesis. MM. Edwards, and Mattei of Bastia, support this opinion. M. Delioux de Savignac, "*Dict. encyclopédique*," art. *Ammoniaque*, says that in his experience, in acute articular rheumatism treated with this remedy, the urine became limpid and ceased to deposit uric acid. The salt has been given in the dose of from 2 to 16 and even 20 grammes (3 ss.—3 v.) in diabetes mellitus (Bouchardat).

*Valerianate of ammonia.*—This is recommended by Pierlot; and Moreau of Tours, and Mesnel consider that it fills a certain place in neuroses. Dose 4 grammes (3 i.) per diem in liquid.



## CHLORIDE OF SODIUM.

*Diabetes*.—Nasse proved that the blood in glycosuria contains less salt than normal blood, and Thierfelden and Uhle, that the urine contains an excess; for this reason, sea-salt has been given, in the hope of repairing the losses which the system experiences, if not of curing the disease. This was done in 1842 by Martin Solon, then physician at the hospital Beaujon; but his results were inconclusive. Coutant ("Thèse de Paris," 1844) and Bouchardat ("Mémoires de l'académie de médecine," 1851, p. 190) repeated the trial; the latter recommended salted meats to diabetic patients, but the effect of the meat was transitory, and was limited to a diminution of the thirst.

*Phthisis*.—M. Amédée Latour having heard from a keeper of monkeys that he preserved his beasts from having phthisis by giving them sea-salt, made the experiment in his own practice, and published two mémoires, in 1857 and 1859 (*Union médicale*). In his second paper his views had greatly changed, for he no longer gave chloride of sodium, but the milk of a goat which had been fed with salt; this increased the appetite and lessened the sweats.

We believe that chloride of sodium in such cases is a more powerful reconstituent than iron or iodine. It has no action on the respiratory system, but it aids nutrition, that is, assimilation. For this reason we advise phthisical patients to salt their food, especially their meat, while eating it.

*Paludal intoxication*.—In 1841 chloride of sodium was recommended as a febrifuge by Piorry (Académie de médecine) and Gintrac père, of Bordeaux, and in 1851 by Bruys, of Bruges.

To give value to any trial, it should be made in a fever district. Dr. Larivière used it at Batna (*Union médicale*, août, 1851), where he gave it to 52 persons; he concludes that salt had a certain action on his patients; that he had cured the accesses in some, and in others had restored the appetite and removed the paludal anæmia and cachexia. It is then inferior to sulphate of quinine, but may in part take the place of the latter when wanting. This occurred to Dr. Pioch, when in 1870 he received in the camp at Sathonay some soldiers suffering with African fever; having no sulphate of quinia, he gave chloride of sodium in the dose of 10 grammes in half a glass of liquid twice a day. When increased beyond this quantity the medicine purged, and had to be stopped.

*Cholera*.—In the epidemic of 1831 Dr. Ochel believed that he found sea-salt useful in cholera; but Récamier, in 1832, Stevens, in 1849, and Aran, in 1843, used the same, with only doubtful results.

More recently, M. Lorain and Dujardin-Beaumetz have repeated the trial, by injecting salt into the veins; under the influence of this active treatment the patients, even in the algid stage, have been seen to grow warm, to cease vomiting, and even to begin to eat.

*Intestinal worms.*—All who have had to treat this trouble have found it somewhat difficult. We would ask attention to this harmless, cheap and accessible remedy, which has been used by M. Lecœur of Caen, in the form of an injection. He gives half a gramme (gr. 8), and finds that one injection almost always kills the oxyures, and more than two have never been needed.

#### EXTERNAL ACTION OF CHLORIDE OF SODIUM.

All who have written on warm sea-baths, as Gaudet of Dieppe, Roccas of Trouville, Joubert of Villers, etc., confirm our account regarding the physiological action of this salt. The following is a statement of the results obtained by Dr. Bergeron at the hospital of Berk-sur-mer in the Pas-de-Calais, from July, 1861, the date of his installation, to Dec. 31, 1865:

During this period 380 scrofulous or rachitic children were sent to Berk by the hospitals of l'Enfant-Jésus and Sainte-Eugénie, and by the Service des Enfants Assistés, from Paris and from the arrondissements near that of Montreuil. The average period of residence of these children was nine months. Some, who had a mild form of scrofula, remained at Berk only six or eight weeks; others, who presented a deep and obstinate form, the cure of which required a real transformation of the organism, passed more than a year there.

In the earlier part of this period, says M. Bergeron, for want of experience to guide in a selection, all the forms of scrofula were sent, from scrofulidæ of the skin and mucous membranes to the most profound caries, and even necroses consecutive to suppurative periostitis; but by degrees it was found that while all the children derived the greatest benefit from the vivifying effects of the baths and the air, there were certain local lesions which were but slightly affected, or even were made worse, while others were absolutely obstinate to this influence. For instance, chronic blepharitis, and, in general, diseases of the eye and eruptions of simple and impetiginous eczema, were rarely improved, and usually made worse, while otorrhœa without osseous lesion, extensive caries, and profound necroses, remain stationary indefinitely. From that time the indications were clearly traced. For the last three years, the cases preferred were those of enlarged glands, cold abscesses, scrofulous gummata, white swelling, and rachitis.

Of 380 children sent to Berk, 118 had chronic adenitis, chiefly of the cervical and submaxillary regions; usually consecutive, either to eruptions of the face or scalp, which mostly disappeared at the moment of departure for the sea, or else to old deep lesions of the limbs or trunk. These 118 presented all the varieties of chronic adenitis, from recent simple engorgement without induration to glandular masses infiltrated with tubercle, with or without ulcers of the skin. Scrofulous adenitis is notoriously an obstinate complaint under any treatment. Of these children 85 were



completely cured, excepting one who succumbed to a cachectic condition which was not arrested by the influence of the sea; while all the rest improved, and would no doubt have greatly increased the number of cures if they had not been sent back prematurely for divers reasons.

The saline air has not the marvellous power of dissolving cretaceous indurations and producing immediate cicatrization of scrofulous ulcers. M. Bergeron does not hold such a view; but it seemed to him that simple indurations, however old and indolent, recovered under this influence more rapidly than when treated by the usual drugs, and that cervical or submaxillary glands which were completely transformed into tuberculous nodules had sometimes disappeared, after a long period, without leaving any traces beyond a movable indolent induration.

“I have seen several such cases,” says he, “among the patients at Berk; and while these facts are not new, they deserve to be noted as showing how great benefit may be derived from saline waters in the treatment of certain cases of tuberculous adenitis, which are so seated as to become far more dangerous than those seated subcutaneously; I refer to mesenteric and tracheo-bronchial adenitis.”

We give some of the results in the worst forms of scrofula, particularly of the long bones and the peri-articular soft tissues.

There were admitted to the Berk hospital 85 children with white swelling, most of them in the way of recovery, while others were in a stationary condition, in spite of the most rational treatment, and others were in a desperate state, as regards the preservation of the limb. Of these 85 patients, 4 died, 3 from excessive suppuration, and 1 from a complication of visceral tuberculosis; 13 left Berk without sensible improvement. Of the 18 who returned to Paris incompletely cured, but so far improved that a cure could confidently be expected, there were several whose cases were very interesting. “Coming to the sea-shore in a pitiable condition, from general exhaustion and grave local disease, little by little, under the influence of a revivifying atmosphere, these unhappy beings felt their appetite returning, their strength renewed; the swollen joints soon began to lessen in bulk, the suppuration became less, and most of the fistulæ healed; sometimes the joints even recovered a part of their mobility.”

Of 38 patients with Pott’s curvature, 12 returned completely cured; the iliac abscesses were absorbed, the general health was perfect, and the walk was as free and easy as the curvature of the spine permitted. Two children sent back as cured returned after five and seven months with new collections of pus. Seventeen others who, for divers reasons, left the place prematurely, were improved in general health, but not cured, some of them with a commencement of absorption in the “abcès par congestion.” Six went away without any benefit, and three died from excessive suppuration.

Of the entire number of 380 cases, 284 recovered, or 74 per cent.; 93 were improved, or 24 per cent.; 18 died, or 4.7 per cent., and in 35 the

effects were null, 9 per cent. These figures place the power of the sea-treatment beyond a doubt.

Such are the chief indications for sea-baths; for the rest, we shall note here only those diseases which are not benefited by cold sea-baths, but may be improved by warm sea-baths and water containing common salt.

*Lymphatism.—Scrofula.—Rachitism.*—Children under three years of age cannot take surf-baths without danger, while warm sea-bathing does them the greatest good, and assists the action of the sand-bath which they take all day in playing on the beach.

Among the scrofulous affections, those which are most benefited by water charged with chloride of sodium are the chronic adenopathies, articular and osseous lesions, and inflammations of the ocular, palpebral, and nasal mucous membranes, and scrofulidæ of the skin. These affections are advantageously treated by warm sea-baths at the establishments of Salies, Bourbonne, Balaruc, Salins (Jura), Lamotte, and Kreuznach.

*Atony.*—Senile debility, and that due to any physical exhaustion, are greatly improved by baths of warm sea-water; and the same is the case with the debility of pregnant women and of those who are fatigued by successive pregnancies or nursing.

*Uterine affections.*—Nervous or inflammatory hysteralgia is relieved in a remarkable way by baths of warm salt water like those of Bourbon-l'Archambault.

*Rheumatism.*—Patients subject to the rheumatic diathesis and who suffer from atonic rheumatism, or from catarrhal susceptibility, obtain from salt water a power of resistance which enables them for a time to avoid these complaints. This property of the chloride of sodium waters is best found in those of Salies and of Bourbon-l'Archambault. At Bourbonne very good effects have been noticed in dry arthritis.

*Paralysis.*—The stimulant action of chloride of sodium waters on the periphery, aided by their laxative action, has helped hemiplegic patients in recovering movement, after apoplexy or paraplegia. Those which have the best reputation in these cases are the waters of Bourbonne, Bourbon-l'Archambault and Balaruc. The same is true of muscular and articular stiffness, following fractures and wounds in war.

#### ALTERATIVE TREATMENT IN GENERAL.

There are certain agents of the *materia medica* which have only a transient action upon the system; the modification seems to have affected the nervous system only; a few moments, hours, or days efface all traces of the passage of the remedy. In this category we place the irritants and the escharotics, which, while causing an active or local disturbance as forcible, do not strike to the inward parts of the system, and limit their action to a short range.



Others there are which bestow on the organic elements something which remains, which survives the original impression; it may be a constituent element or an improved functional aptitude, and then the remedy is called an analeptic or reconstituent; it may be that the blood and the humors are altered in kind, are made less fit to aid in the act of nutrition and to furnish materials for acute or chronic phlegmasiæ; or act by preventing the generation of secondary accidental products; the latter class are called alteratives.

In the case of diseases which hardly modify the system, or which occupy an organ of minor importance, it is easy to see that a superficial treatment, if we may so speak, is sufficient to cure; but when the system is deeply affected, when an extremely important organ is touched, or a great number of local lesions are equivalent to one lesion of great extent; or when a disease, chronic in its progress and its form, rebellious and tenacious in its nature, has become rooted in the system, a more energetic resistance must be made to the more vigorous attack; and then it is that we have to use agents which cause deep modifications.

At the head of alterative remedies we must place bloodletting. This practice, which we shall study especially under antiphlogistic treatment, not only despoils the vascular system, and in consequence all the tissues to which the latter carries life, but it changes the intimate composition of the blood, as we shall show later. But though often applicable in acute conditions, it cannot be denied that this remedy is usually inadmissible in the chronic state; frequent and long-continued bleedings would compromise the general health too much. We have then to recur to agents which modify the blood without entirely destroying the reparative elements it contains. Such agents are the alteratives.

The alkalines occupy a place among these remedies which is certainly as important as that of mercury, to which, as to iodine and arsenic, we have given much attention; we must here devote a few lines to their study.

Such is the importance of the alkalines, that they may be said to be as necessary to the accomplishment of certain functions as oxygen is to respiration.

If, now, it be necessary to define the mode of action of these agents, and their special rôle in the economy, we should say that our modern physiologists consider the alkalines as indispensable to the phenomena of endosmosis, combustion, digestion, and the secretions.

Thus, they are believed to contribute to maintain in the blood that degree of viscosity which is necessary to render it fit for endosmosis, exosmosis, and the various compositions and decompositions which constitute organic life. They enable the saccharine and amyloid foods to unite with oxygen, and to assist in the functions of respiration and calorification. They make the elements of the bile fluid, prevent them from inspissating and forming concretions or calculi. Let us add that they emulsionize and saponify the fatty matters, maintain the intestinal diges-



tion, facilitate secretion, and thus actively co-operate in all the acts of nutrition and assimilation.

Whatever may be the value of these physiological interpretations drawn from chemistry, it is very certain that the alkalines have an immense influence upon the system, by the same title with the acids; and it could not be otherwise. The blood is naturally alkaline in a certain fixed degree, whereby it is made able to distribute special chemical qualities to the various secretions. Of these, some are slightly alkaline, as the saliva and pancreatic juice; others are so to a very high degree, as the bile. Others are very acid, as the urine, sweat, and gastric juice. If the blood is rendered more alkaline by the use of alkalis, there will come at last a special condition of the blood, a new state of the secretions. Those which are naturally alkaline or neutral will increase in alkalinity; those which are acid will become less so, or will be neutral or alkaline. These are necessary chemical effects. If the presence of acids is a necessary condition of the stomach-digestion, it cannot be a matter of indifference to neutralize the acids. Furthermore, chemists say that a correct proportion of alkalis in the blood enables this liquid to consume in due proportion the carbonaceous elements absorbed in the act of digestion, such as sugar, fats, alcohol. An incomplete combustion would doubtless produce the evils of which we shall presently speak; but excessive or too rapid combustion is equally dangerous, as causing important changes in the composition of the blood, and therefore in the texture of the organs.

If this be true, the giving of alkalines, in health or in sickness, can never be a matter of indifference. If taken without good grounds for a short time only, they do but momentary harm; if taken largely and long, they cause a deplorable cachexia and emaciation.

The influence of alkalis on the composition of the blood was admirably stated by the ancients. They had seen that this nourishing fluid became paler and more fluid; and that at last a state of cachexia was established, characterized by pallor, general puffiness and passive hæmorrhages; emaciation, often irreparable, followed. The excessive use which has lately been made of the waters of Vichy, Carlsbad, and Pougues in treating gout, has furnished illustrations of this point; we do not fear to say that the abuse of alkalines has caused more harm than the abuse of iodine.

When in an acute disease we wish to produce in the crisis of the blood a rapid change analogous to that caused by bleeding, we use mercurials, especially calomel, by Law's method, as described above; but when there is a chronic disease of the liver or a diathetic disease with a real or supposed predominance of acids in the secretions, such as gout, we must use the alkalines—taking care not to pass beyond our aim.

The attacks of gout are certainly lightened by using the waters of Pougues, Vichy, or Carlsbad with perseverance; the formation of uric acid gravel in the kidneys may be prevented with still more certainty by the same remedies; but to extinguish the symptoms of gout is not to cure



gout, any more than driving away cutaneous eruptions by local remedies is curing syphilis. The diathesis is so persistent that the attacks will return unless the patient places himself under special hygienic influences. It is doing a great deal to make the attacks less frequent and acute, but if we undertake to destroy the diathesis, as certain ignorant physicians profess, we undermine the foundations of the constitution, and the abuse of alkalines brings on the cachexia of which we lately spoke, a morbid condition much more grave and incurable than gout and gravel.

The liver swells and becomes fatty in animals fed on highly carbonized food and kept inactive. We know that exercise is one of the best means of assisting the destruction of the carbonized principles, especially fat; we know also (and here the chemical theory agrees with clinical experience) that the consumption of alkalies and the consequent alkalization of the blood usually hastens this destruction and supplements an inactive respiration. It is well established that the alkalines diminish the coagulability of the blood; and it would seem, though we by no means affirm it, that in attacking the albumin and fibrin directly they acquired the power of dissolving the two chief basal elements of most chronic engorgements. This property is most remarkable in the case of hepatic engorgements, vulgarly called obstructions. Theory, then, would have led to the use of alkalines in chronic disease of the liver, even if practice had not decided hundreds of years ago.

But the alkalines must not be abused. Physicians do not sufficiently bear in mind that the inherent properties of the living tissues enable them to resolve engorgements when the first impulse has once been given. In bleeding for pneumonia, we suppose that we are removing the excess of blood from the lung: this idea cannot be entertained by any one who has any notion of physiology; it is rather that, after the bleeding, an obstacle to the performance of the nutritive functions of the pulmonary tissue is removed, and resolution is effected by virtue of properties inherent in the tissue of the lungs, without subsequent medical interference.

The obstacle which is sometimes removed in one instant in acute disease can only be destroyed slowly in chronic disease; but when removed, the properties of the tissue resume their rôle, and the physician should be simply an attentive and intelligent spectator.

This should enforce the precept which we just gave, to wit: that in treating chronic disease of the liver we must stop the alkalines as soon as resolution of the engorgement fairly begins; not pursuing the disease, which is bound to get well without us.

A neglect of the natural powers of the tissues is the reason why so many physicians use alkalines too long in complaints of the liver. A person feels a little better on returning from Vichy, Pougues, or Carlsbad; his health is confirmed during the winter. He thinks it necessary, in order to prevent relapses, to take the waters several months, for some years in succession; but instead of the former benefits, he gains only discomfort, and sometimes serious trouble, which he ought to ascribe, not to the ob-



stinacy of his disease, but to his blind persistence beyond the point of usefulness.

How is it that physicians do not see that a remedy which is powerful to cure must be powerful to do harm?

The alkalines are given with singular levity. A month or two of the water of Vichy, Carlsbad, or Pougues is prescribed as one would order a ptisan of barley or borage; but is it of so little consequence, to alter at one blow all the secretions of the body?

Other alterants are usually handled with more prudence; mercury is considered a serious thing, because its danger is understood a little better. And so with iodine.

Yet, how many physicians in constitutional syphilis give mercury with deplorable persistency, following on the heels of every symptom, and never thinking the disease overcome till the periostoses are entirely gone, and the necrosed portions of the palatine or ethmoid have all fallen!

The general conception, more or less vague, of a specific is that it goes directly at the principle of a disease, and neutralizes it directly by its own force. The laws of the organism do not apply to it. It is neither by a stimulant, sedative, cold, hot, dry, moist virtue, nor by any other particular property, that it acts specifically; but, as Galen says, by its whole substance. Cinchona cures intermittent fever, not because, as some say, it is tonic—or as others say, sedative, astringent, and mummifying, stomachic, diaphoretic, antispasmodic, etc. No; between the cause of intermittent fevers and cinchona there exists an incompatibility in which the disease succumbs, as in the case of two botanical or zoölogical species which cannot live together, so that one always destroys the other. Mercury does not cure syphilis because it is acid or alkaline, antiplastic as is now said, or coagulant, as was formerly thought. It acts on this disease as blue ointment does on lice—it kills it. The organism has no chance to interpose in the action of cinchona or mercury: it contains certain entozoa, which the drugs poison, and that is all. The poison acts by affinity; without injuring the organism, it exterminates the parasite as in a test-tube. This is of course very simple; the disease is not so mysterious as had been supposed.

We beg to call attention to one point: in this theory the disease is confounded with a morbid product. It is compared with something contained in the system, as the worm is in the intestine, or mechanically mingled with the blood, or extravasated in the tissues. This is the interpretation given by humorism; the uselessness of the organism during the action of the specific is manifest. Everything occurs in it, yet without its action. Who is bold enough to sustain this theory? Professed or not, expressed or implicit, it is nevertheless that of the immense majority of physicians, and almost all our pathological and therapeutical writings presuppose it. It is as pregnant with dangers as with errors.

The specific remedies have no other general method of action than those which are not specific. In brief, they act either with the assist-



ance of life or without it. To its acting without life there are grave objections.

Mixed with mercurial preparations, the syphilitic virus is most positively inoculable. Taken before the development of visible syphilitic lesions, mercury does not prevent them. This might excuse us from finishing the refutation. Syphilitic and mercurial symptoms pursue their way together in the same person without influencing each other at all. The mercurial not unfrequently aggravate the syphilitic symptoms, adding their own characteristics and producing a mixed affection, a syphilitico-mercurial cachexia, which is very hard to cure. Finally, by the side of persons whom mercury cures of ordinary syphilis without producing any appreciable mercurial symptom, there are others in whom the disease pursues its ravages undisturbed. Add another very common case, and we have all that are possible—the appearance of mercurial accidents simultaneously with the disappearance of those of syphilis. Considering this diversity of the relations between the two series of symptoms, one venereal and the other mercurial, what is the meaning of the cases in which a mercurial modification, whether appreciable or not, dispels the symptoms of syphilis?

Singular contrast ! Mercury arouses in the healthy tissues alterative, antiplastic, exulcerant actions; and in tissues devoured by syphilis, plastic and separative actions. What was the cause of destruction in one case is the cause of regeneration in the other; and it is the same mode of irritation that produces such opposite effects ! How can these contradictory properties be ascribed to one modifying agent, if its scope be limited to its action as an antidote, which neutralizes a poison by forming with it a harmless compound ? To respond by ulceration and by cicatrization to the same influence is a proof of capacity for two opposite effects. They do not proceed in reality from the mercury, but from the organism as impregnated with the virtue of mercury. Our body then contains morbid properties which mercury brings to activity by the effect of certain qualities which belong to it alone, and which may be called specific qualities, if we do not attach to the word an occult and reserved sense, but which we prefer to call simply mercurial. Every body in nature has properties which none other possesses, and in this respect mercury forms no exception. The tonics and the emollients, water and wine, are in this respect as incomprehensible as mercury.

The system cures syphilis under the influence of mercury. We must keep ourselves within this idea. Nitrate of silver applied to a chancre cures it perfectly: shall we infer that it is a specific in syphilis ? Who does not see that this agent merely excites a morbid vital action or an irritation which is different and less injurious, and is spontaneously cured ? If mercury be the counter-poison of syphilis, why does it not always neutralize it ? It will be replied that it does this, when syphilis is free from other pathological elements. We may as well say, with Hunter—who was, nevertheless, an exaggerated partisan of mercury—that mercury is



the antidote or specific remedy of the venereal disease considered abstractly. And yet, spite of his fanatic attachment to mercury, Hunter regarded its action as a vitalist would. Our present object is simply to apply the general laws of all medicines to the specific remedies, which are always represented as more mysterious and extraordinary than the others; and to prove, further, that their exceptional efficacy in various diseases depends upon certain exceptional peculiarities in the diseases quite as much as on the intrinsic power of the remedy.

The organism, excited by food, draws from it the various components of the body. It stands in the same relation to remedies, educing their properties, developing and vivifying them; for through it they become alive, or life itself modified in various ways. It assimilates or makes similar to itself a part of these foreign forces. They pass into it, it raises them to its order of activity. It transfers them, not by juxtaposition, but by intussusception; and it then draws the remedial action from itself, "ab intus suscipit." A living mirror of the properties of these poisons, one may say that it becomes successively opium, mercury, cinchona, antimony, belladonna, etc. It is, if we choose, opium, mercury, etc., in a more elevated order of activity, more truly representative of their essential properties, which live for a moment a superior life, and are for a moment in a certain sense animalized. There are neither metaphors nor comparisons here, but the most absolute physiological rigor; we are at the root of therapeutics. Vitalism rescues toxicology from the lower region of retorts and alembics; and, without breaking with tradition, but largely supported by it, raises *materia medica* to the dignity of physiology.

The specifics and their type, mercury, can claim no exception. The healthy organism must consent to its physiological action; and to the latter, the syphilized organism must consent. There is no more chemical action in this than in nutrition or conception, and we may say in full strictness that, in order that mercury shall act, the syphilized system must conceive the properties of mercury, just as, in order to contract syphilis, it had to conceive the syphilitic virus. But the latter acts on the system more profoundly than mercury, for it is a product of the system, a more intimate morbid poison than any other. Mercury does not thus affect the system in its essence; it modifies the nutrition and secretion transitorily, and thereby affects the deviations in their functions which the venereal poison occasions. But these symptoms presuppose invisible roots to the malady. Mercury, a body not homogeneous to our own, seems unable to pursue the initial living cause of syphilis thus far—or, if it does so, it seems unable to identify itself with the system. Mercury, then, attacks the symptoms and not the principle. But what a specific, even from this aspect! And is it quite true that it cures all the symptoms so wonderfully? Here, perhaps, we touch the secret of mercury.

Mercury is most efficient in one phase of the venereal disease, that of the secondary symptoms, which affect chiefly the skin and mucous membranes. It is at least useless in the primary symptoms; taken then, it is



not proved that it prevents the development of secondary symptoms. Finally, its efficacy diminishes in proportion to the remoteness of the primary impregnation; and in the third order of symptoms, those of the deeper organs, bones, the weakly vitalized white tissues, its therapeutic activity is so weakened that it loses a great part of its privilege and yields its specific virtue to iodine. Let us mark well, that in the period when we may usually do without mercury, it is no more a specific than nitrate of silver or any other substitutive modifier. When the disease has struck deep root, and is hard to tear out, and has intimately altered the constitution, mercury is of hardly any more value than in other non-venereal affections of the same parts, and iodine easily contests its superiority. The time of its triumph is the intermediate period, which, of all the non-organic affections of our tissues, is the most mobile, the most diversified, the most modifiable, the most alterable. For incurability, it cannot be compared with cancer, tubercle, etc. Now, mercury is the most potent of alteratives. How do we know that its specific virtue is not due to this alone? Why should so singular an anti-venereal power fail in deeply rooted syphilis, and sometimes in that which is not yet rooted? Why, after one mercurial course, can we never be sure that a second or third attack will not appear, and infect the descendants? And if mercury is a specific in the scholastic sense, why does it demand the hygienic and therapeutic conditions which all diseases and treatments require? Does it cicatrize? Physiologically, it causes ulceration. When the organism is unsound, the syphilitic accidents are ill-defined, depraved, lose their specific distance, as Hunter said; in a word, have no tendency to spontaneous cure. Mercury too often increases this unhealthy disposition. The organism must be modified in order that this famous specific may regain its power, which is called so direct. In certain very irritable persons, opium must be added to it, or it will not act, or will do harm rather than good. At other times tonics must be used simultaneously in order to insure success, or, it will cause an increase in the venereal symptoms, unless its administration is preceded by venesection, etc. It is exactly as in the case of remedies which are not in the least specific. It must have the system at its disposal, just as if it were a common remedy. Therefore, it does not act alone: it does not neutralize the principle of the disease by an immediate and specific action, in the sense of the schools. Nothing is more conditional than its effects.

Syphilis may recover spontaneously at a certain stage; and it recovers under the influence of mercury. But the mediate causes or conditions of cure may be very various; its immediate and efficient cause, its principle, if we choose, cannot differ from itself; it is one and identical with it. Now, syphilis recovers spontaneously, or rather, the organism cures syphilis by its own power; therefore, it cures syphilis when mercury is given. We also conclude that it is impossible that this should be otherwise, according to the physiological laws which we have stated, and which govern all treatment.



The indication for alteratives occurs in acute and chronic disease.

1. *In acute disease.*—We have said that alteratives are in place at the beginning of an acute disease, when it is necessary to modify the crasis of the blood almost instantly, as venesection does it. There are two sorts of these alteratives; the one class liquefy, attenuate the blood directly and without previous excitement; these are mercury and the alkalines; the others, before producing their effect, cause a general excitement, which is active in proportion to the promptness with which the effect is sought; these are arsenic, iodine, gold, and platinum. The latter should never be used in acute diseases.

As regards mercury and the alkalines, with which we might class nitrate of potassium, they act as alteratives without intermediate phenomena, almost as venesection does. For example, mercury in puerperal peritonitis, synovial rheumatism, and frank acute inflammation of the parenchyma and the membranes; and the alkaline salts of sodium, carbonate of potassium, and especially nitrate of potassium in very high doses, in the same circumstances.

These three agents must not be used indifferently, for their range is far from being the same. Mercury alters the constitution profoundly, sometimes leaving traces which last for months; the others act immediately with almost the same energy, but in a few days after they are given the system forgets them, as they are easily assimilated or eliminated; nor is the enfeeblement they produce so complete. Hence, the two latter are to be preferred when it is to be feared that the constitution may give way as soon as the inflammation has gone; the former, when the patient is vigorous, the reaction sustained, or the disease one which may be expected to continue.

In typhoid affections (by which we mean not only dothineritis, but all disease accompanied by typhoid accidents) we are especially afraid of remedies whose action is prolonged, such as mercury, and for a very simple reason. Bleeding and alterants fulfil well the indication for depression in cases of excessive reaction at the beginning of such a disease, but bleeding and mercury are agents whose effects are protracted; and if the period of stupor and debility presently comes on, we shall find ourselves deprived of the power of restoring the system to a type of energy suitable for overcoming the malady. We cannot then restore the blood in one day, nor relieve the system of the mercury, with which its tissues are impregnated, and which so profoundly debilitates it. In this case mercury and bleeding should be continued for only a very little time; they should be stopped as soon as the inflammatory orgasm begins to yield.

2. *In chronic diseases.*—When a disease has struck deep root, when the symptoms increase slowly or remain stationary, when the vital organs are involved, or a local affection threatens to become generalized, it is most necessary to insist on remedies to relieve the cause of these affections, or their effects. Sometimes the alterative treatment attacks and neutralizes the cause, and the lesions produced by the cause are after-



wards cured by nature's efforts; sometimes the cause dies out for some reason which we may not recognize, leaving traces of its action which are not cured spontaneously, or only after a long time, and an alterative relieves these after-effects without generally attacking their cause. Thus, mercury, gold, and iodine seem to have a power of rendering the cause of syphilis harmless, while iodine and gold seem to take hold only of the consecutive symptoms. In more exact terms, these remedies do not destroy the cause of syphilis when it is evidently present, but destroy the symptomatic accompaniments; whereas, during the age when scrofula is making progress and consequently is a real existent cause in the system, these remedies seem much less efficacious than at the period when nothing remains to be attacked except the organic changes which have been caused by successive attacks of the scrofulous distemper.

There is something quite direct in the action of alteratives on a dyscrasia or a virus; there is nothing visibly interposed between the cause and the effect. The behavior of the remedy to the system in health gives no indication of its curative power in syphilis or scrofula; but it is otherwise when we consider them independently of their specific mode of action, and as related to the common chronic affections. We can comprehend, up to a certain point, the mechanism of the Vichy waters in certain engorgements of the liver.

In certain diseases there is a great disturbance in the chemical constitution of the fluids of the body. Diabetes mellitus is an instance. The blood, in this affection, is a little less alkaline than in a normal state, the salivary fluid becomes acid, and by virtue of the tendency of the system, starch is converted into glucose on entering the stomach, more quickly and completely than is natural; and the absorbed glucose, circulating in the vessels without finding sufficient free alkali undecomposed, passes into the urine in the condition of grape sugar, having first, by its contact with all the organs, produced severe functional disorders and a cachexia which at last betrays itself by very severe organic lesions.

When the disease is not very far advanced, the use of alkalines, especially the bicarbonate of sodium and magnesium, is almost certain to prevent the saccharine transformation, or at least permits the sugar to be assimilated and decomposed in the current of the circulation in such a way as not to be passed by the urine; while at the same time the thirst diminishes, the perspiration and the strength reappear; and to-day, thanks to this treatment, there are a considerable number of cures, more or less complete, of a disease formerly thought to be almost beyond the resources of art.

Must it be admitted that many chronic diseases, and even some acute ones, may be considered in their local expression as the result of an accidental product analogous to mould, fungi, or lichens?

It certainly cannot be denied that the disease in general causes in the system certain alterations which have some analogies with the lower orders of the animal, and even of the vegetable kingdom.

These low organisms germinate in the system at the expense of fluids altered by disease; they develop on the surface or in the substance of tissues, and form local lesions which cause mechanical impediments, and become foci of malignant phlegmasiæ, which multiply themselves indefinitely as by a sort of fermentation. This pathogeny is easily demonstrable in most of the diseases of vegetables; perhaps it will one day be regarded as not wholly absurd in respect to men and animals.

This idea may form a tolerable basis for explaining how alteratives act in certain chronic diseases, such as dartres, cancers, scrofula, syphilis, the causes of which may be more or less profoundly modified by mercury, gold, arsenic, iodine, etc. Our remedies act on these diatheses as upon the diseased surfaces of living animals, where cryptogams are forming.—How, then, do they cure these last degenerations locally? They probably do it by impressing upon the diseased tissues a franker and more healthy life, and thus restoring them to their normal nutrition and secretions. The remarkable point in these remedies, whether general or local, is that each diathesis and each morbid product has in the *materia medica* some special alterative, which may be called specific, if we choose, provided that we do not seek, in the occult and cabalistic action which this expression still represents, a pretext for empiricism and for a treatment which dispenses with the need of being a physician.

Following our analogy, we see that each species of cryptogamic morbid product in animals has its special topical remedy, which usually succeeds better than others.

It is long ago that our master, Bretonneau, proved, for example, that caustics were like the phlegmasiæ in possessing specific characters; and that the burns caused by each could be distinguished by their forms, course, duration, the character of the pain, the manner of cicatrization, etc.

The incontestable truth of pathological specificity necessarily implies that of therapeutical specificity; and alterative treatment proves this, both by the agents which it employs and by the diseases to which they are applied.

In conclusion, we would offer a remark, intended to meet certain well-founded objections to the classification we have adopted.

The remedies which we have studied in this chapter are not exclusively alteratives. We do not know that there exists in medicine a remedy which can be strictly ranged in one class. Opium has with justice been placed in the class of narcotics; but, on the other hand, opium is a powerful excitant of the circulation, a sudorific, aphrodisiac, and emmenagogue, as gold is a powerful tonic to the stomach. Cod-liver oil, by its complex composition, offers as much difficulty in classification. The chemical principles it contains (iodine, bromine, etc.) give it a place with these alteratives, while its most marked remedial powers would seem to place it



with analeptic tonics. We would indicate two things: first, the difficulty, not to say the vanity, of classification; and further, the necessity of attending to the complex qualities of drugs, and of bearing in mind that they are two-edged weapons, and that it is our duty to be able upon occasion to use one of the qualities and neutralize another which under given circumstances might be injurious.

## CHAPTER IV.

### IRRITANTS.

#### POTASSA.

CAUSTIC potassa is usually employed to open issues. Potassa cum calce is preferable to pure potassa, because it spreads less. Of late years the Vienna caustic has been preferred; it is much superior to potassa with alcohol. The substance is applied by placing on the skin a piece of diachylon plaster with a hole as large as the potassa. The latter is placed at the hole, and is kept there by another bit of diachylon, larger than the first, and compresses and bands over that.

A burning sensation is felt at the end of a few minutes, and then an intense burning which lasts three or four hours, after which everything becomes quiet. On raising the apparatus at this time, a gray spot is seen, a little soft at its centre, and coriaceous at its circumference. This spot usually occupies the whole thickness of the derma, and is four or five times as broad as the diameter of the piece of potassa. This circumstance must not be forgotten in selecting the potassa.

The eschar, at first soft and moist, soon dries and takes a darker tint. If a piece of diachylon, or any other substance capable of retaining moisture, is constantly applied to the skin, the eschar remains soft until it falls.

The destroyed portion of derma falls at an indeterminate period; if it was not adherent to the tissue beneath, it usually falls in from six to ten days; but if the skin is thick, it may not be detached for two months. The separation from the quick commences at the circumference.

The size of the eschar and the slowness of the separation always cause an objection to the use of caustic potassa, and, in general, of the potential cauteries, for making issues. The lancet and bistoury are certainly preferable if the patients are not timid.

The Vienna powder is prepared for use by adding alcohol or eau de cologne, and making a firm paste, which is extremely caustic, and has the advantage of not spreading. M. Hennau (*Revue médicale*, 1833, t. I., p. 212) used it to establish issues. He required from six to ten minutes to form the eschar. We had often repeated his process for establishing issues, when it occurred to us to employ it in the treatment of superficial cancerous tumors, especially of the breast, upon which subject we published a paper in the *Journal des connaissances médico-chirurgicales*



(décembre, 1835). A caustic paste used in the same case, composed of lime, potassa and opium, has been described in the “Pharmacopée universelle” of Jourdan, t. II., p. 317.

Since the publication of our paper, M. Bonnet, of Lyons, employed caustic potassa to cauterize the skin and the walls of veins for the purpose of obliterating the chief trunk of a superficial group of veins on the leg, in the case of severe varix or varicose ulcer; but Aug. Bérard justly prefers the Vienna caustic to potassa for this purpose. He has, by our advice, attacked *nævi materni* with the same caustic, and his results lead him to place this treatment above all others, at least in most cases.

Several surgeons have been struck with the bad effect of the too frequent application of caustics in uterine affections, an effect which led Amussat, following Dupuytren’s example, to use caustic potassa, which is powerful enough to convert all the altered tissues rapidly into an eschar, so that only a few applications are needed in order to give a complete cure. But, on the other hand, potassa itself has inconveniences: it melts very quickly, and may flow behind the speculum down the posterior surface of the vagina, producing eschars which in some cases have perforated the recto-vaginal septum. This mishap cannot be avoided without the most minute care. The following preparation has been made by M. Filhos, at the suggestion of Amussat:

R. Potassa.....	200 grammes.
Quicklime.....	100 “

These are put into a large iron ladle and exposed to a very quick fire. The potassa soon melts, and the lime a little later. When both are completely liquefied they are very thoroughly mingled and cast in cylinders, the mould having first been warmed; the sticks are not to be taken out until perfectly cool. The melted caustic is usually poured into leaden tubes with thick walls, closed at the ends, and kept in glass tubes containing quicklime and hermetically stoppered. The cylinders are excessively hard. They quickly absorb the moisture of the air, becoming covered with a mixture of hydrate of lime and potassa. To preserve them for an indefinite time they may be covered with a lamina of lead, or, still better, with a thin layer of sealing-wax, as directed by M. Dumeril for stick-nitrate of silver; they are afterwards enclosed in glass tubes, which are carefully stoppered.

This caustic adds to the advantages of potassa, that of not melting so quickly when used. M. Filhos directs the following method of application. The patient is placed on the edge of a high bedstead, her legs supported on chairs, and her back so high that the vagina takes an oblique position, pointing downwards and forwards, so that the liquids which flow from the *cervix uteri* may pass directly into the speculum, instead of going between the instrument and the vaginal canal. The full speculum is to be preferred. It is to be oiled and introduced carefully,

and the cervix well exposed. The affected part is then sponged with the greatest care, and a small dossil of charpie or cotton attached to a long thread is introduced in front of the anterior extremity of the lower valve of the speculum, immediately below the neck of the uterus; this is to protect the part of the vagina below the point to be cauterized. With a little practice the latter operation may usually be dispensed with; it prolongs the operation somewhat. The cylinder is next applied, held in a porte-caustique or fixed in the end of the glass tube which contains it. After the cauterization the eschar is quickly wiped with balls of charpie grasped with the forceps, which is placed at one end of the porte-caustique. The dossil of charpie is then promptly removed and two injections of cold water are made, or better, of water slightly acidulated with vinegar; the injection must be made to reach the neck of the uterus. The acidulated water neutralizes the small amount of caustic which may adhere to the eschar. After the injection a small piece of bandage must be placed in the vagina, with the lower extremity projecting between the labia majora, for the purpose of withdrawing it. The patient is then replaced in her bed.

The caustic stick must be exposed only at one end. If the exposed end is covered with a slight crust of subcarbonate of lime from previous use, it must be removed with a file. The action may be made more vigorous by dipping the caustic lightly in alcohol, brandy, or cologne water. After cauterizing, the cylinder must be wiped with care before it is replaced in the glass tube.

M. Levrat-Perotton has recommended caustic potassa for ingrowing nail, to check the fungous growth ("Transact. méd.," t. XI., p. 41). M. Solera uses it as a cylinder, covered with shellac varnish, in treating lachrymal fistula, pterygium, trichiasis, unhealthy ulcers, ranula, contractions of the rectum, ulcerations of the neck of the womb; and to perforate the membrana tympani (*Bulletin des sciences méd.* de Férussac, t. XX., p. 336). Without sharing M. Solera's exclusive admiration of this caustic, we gladly admit that, when used in his way and with the little precautions which he advises, it renders very great service in surgery.

Gimbernat used it in a collyrium, in the dose of 5 or 10 centigrammes to 30 grammes of distilled water (gr. 0·8—1·6 and  $\frac{3}{4}$  i.) to remove maculæ of the cornea. Saviart and Cohen dissolved it with camphor or alcohol in water, to stimulate indolent ulcers.

The properties of subcarbonate of potassium are precisely those of potassa, except that externally it can only be used locally and not as a caustic. But, in all cases where potassa is used otherwise than as a scarifier, it is much better to use the subcarbonate. Baths, lotions, vaginal injections, and pomades, must be made with the subcarbonate, and not with pure potassa. These local applications are of especial use, as we have said, in affections accompanied by pruritus.

The specific for tinea, of the brothers Mahon, is only a mixture of alkaline substances derived from the ashes of green wood.



For gouty patients with very marked uric diathesis, Dr. Galtier Bossière prefers the alkalines to weak organic acids, tartrates, citrates, malates of potassium especially, and also of sodium and magnesium, to all other alkaline carbonates, and even to the alkaline mineral waters.

He uses with benefit the following mixture, usually in the interval of attacks, but also at the beginning or end:

Tartrate of potassium . . . . .	50 grammes	( 3 xiiss.).
“ “ sodium . . . . .	30 “	( 3 viiss.).
“ “ magnesium . . . . .	20 “	( 3 v.).

Mix, pulverize, and divide into ten papers, each containing 10 grammes ( 3 iiss.).

As an alkaline drink, take daily half or the whole of a paper in a large cup of ptisan of inula, orange, or ash.—As a purgative, take every week, fortnight, or month, three or four papers in as many cups of the same ptisan.

For external use in gout, M. Galtier Bossière much prefers potassa to soda and the other alkalines. In gouty affections of the limbs, when there are no acute pains left, he has often used general or local baths, in which he places from 30 to 60 grammes (say  $\frac{3}{4}$  i.—ii.) of caustic potassa for a full bath of 300 litres (quarts). He uses a solution of 2 or 3 grammes (gr. 30—45) to a quart of water to make fomentations in tophus.

### SODA.

This substance was long confounded with potassa; and, in truth, the chemical and physical properties of the two are almost identical. Its therapeutic properties are almost alike. There is, however, one important distinction to make.

In external use there is little difference; whether soda be used with alcohol or lime to open issues, or whether subcarbonate of sodium be used in solution for local or general baths, vaginal injections in pruritus of the vulva, etc.

The neutral carbonate, also called subcarbonate, is used externally as an alkaline and irritant. We use it daily in soap. This is a substance of remarkable properties. It first frees the skin of its sebaceous coat, and softens the superficial layers of epidermis, which are carried away by the water, and thus rids the skin of many foreign substances which are insoluble, or slightly soluble in water. The epidermis, scraped off, leaves the skin sensitive to the action of the alkaline, and an increase of peripheral circulation follows, with a certain increase in the heat of the skin, which often lasts several hours after the bath.

The bath of carbonate of sodium, by producing this peripheral fluxion, has a valuable derivative action, which is of singular use in aiding the action of alkalines taken internally. This effect is often sufficient to ar-

rest certain visceral fluxions. We will point out by the way that the constipation of young children, which is so hard to treat with internal remedies, yields almost immediately to the alkaline bath. For this purpose we do not dissolve the salt in the bath, but soap the child's body all over before the bath, either with common soap, or better, with black soap, which is made with potassa.

#### SILICATE OF SODIUM.

*Blennorrhagia*.—M. Gontier, interne of M. Marc Sée, at the Hôpital du Midi, has treated seventeen patients, almost all in the acute stage of blennorrhagia, and the majority having orchitis, with three daily injections, containing on the average 2 per cent. of silicate of sodium. All that can be said is that the injection was usually well borne. The reports are not such as to lead to a substitution of this for ordinary astringent injections; it is much more expensive, and perhaps is not always of uniform composition. The same may be said of the treatment of non-infecting chancres.

*Cystitis*.—Dr. Dubreuil, surgeon to the hospital of Lourcine, has employed the same solution in cystitis with purulent and ammoniacal urine, and has had some success (*Société de chirurgie*, 13 novembre, 1872). MM. Gosselin, Marc Sée and Champouillon have obtained analogous results; but it is hard to say how much is due to silicate of sodium, for the washing out of the bladder, and the care taken to empty it completely, are almost sufficient to cure the disease without medicine.

Others have sought to prove that there is a category of mineral waters which owe their action solely to the amount of silicate present. Dr. Hugues, physician to the silicated waters at Sail-lès-Château-Morand (Loire), who had proposed this theory, claims that the silicates are the only active principles of the waters of Plombières, of Evaux, of Arlanç and Sail, which contain from 0.13 to 0.25 grammes per litre (quart). This hypothesis is far from being justified; all that can be said is that the waters of Sail accelerate the cure of ulcers, whether atonic, varicose or scrofulous. The attempt to make these waters a substitute for those of Vichy is quite unjustified.

#### LIME.

Lime is less caustic than potassa and soda. It is rarely employed alone as a caustic. United with medical soap in equal proportions, it was formerly used to destroy warts and fungous growths, to modify the surface of certain carcinomatous sores, and to destroy some superficial tumors (*Ancien Journal de médecine*, t. LXXX., p. 309). The Vienna caustic is a very energetic powder composed of 6 parts of quick-lime and 5 of potassa; and the *pâte d'Else*, composed of opium, potassa and lime,



may also be of much use in surgery. M. Jobert has used Vienna caustic with success in wens, by painting it on.

An English physician, Dr. Osborne, has proposed in the *Dublin Journal* a new method of cauterization, to take the place of the ordinary moxa. He uses for this purpose quick-lime. A piece about 12 millimetres (0·47 inch) thick, as fresh as possible (this condition is indispensable to success), is placed in a porte-moxa, or on a card pierced at its centre with a round hole, and the instrument is applied to the skin at the point to be burnt. A few drops of water are then let fall on the lime, which immediately swells and crumbles, giving rise to a heat of about  $187\cdot5^{\circ}$  centigrade ( $369\cdot5^{\circ}$  F.). The lime must be withdrawn before all the heat of which it is capable is disengaged; otherwise the derma would doubtless be destroyed in its whole thickness. It is of course easy to get an eschar more or less deep, according to the length of time the lime is left in contact with the skin.

Osborne thinks that this moxa is preferable in some cases to all others. It gives instantly a very intense heat, with the advantage of producing an action at once rapid and deep, without terrifying the patient with the sight of fire and the sparks which burning bodies almost always give out.

This alkali forms the basis of most epilatory pomades, including that used by the brothers Mahon to get rid of the hair in tinea, which is at the same time curative of the disease; also of the epilatory powders, in combination with orpiment, a mixture which is not free from danger, and may even cause terrible accidents if used to remove hair from ulcerated surfaces.

*Tinea*.—Böttger, a distinguished chemist of Frankfort-on-the-Main, was the first to remark the very energetic depilatory power of sulphohydrate of sulphuret of calcium. This substance is obtained by causing sulphuretted hydrogen gas to be absorbed to saturation by a pulp composed of two parts of slaked lime or dry hydrate, and three parts of water. It forms a greenish-white jelly.

It is used by spreading a layer of about two millimetres in thickness (0·08 in.) upon the part from which the hair is to be removed. After two or three minutes, it is removed with an ivory knife or a cloth, and the skin is found entirely freed from the hairs, without any excoriation or injury of the epidermis, and without any sensation except a certain stinging.

While recommending the trial of this new remedy, we must warn physicians that it sometimes attacks the skin slightly, and often produces redness and pain; but these are usually too slight to contraindicate the remedy.

*Burns*.—The liniment formed of a soap made of one, two or three parts of lime-water and four parts of oil of sweet almonds, is especially recommended by Velpeau in the treatment of burns; it has been of real service in burns of the three first degrees; that is, up to the degree of

severity which causes the mortification of the skin to a certain depth, with suppuration and a cicatrix.

When there is simple redness or blistering, the use of the liniment often causes very rapid resolution.

An old woman received a burn in the third degree upon the front of the chest. The suppuration increased her debility in an alarming way, until the application of the liniment caused desiccation, and the strength was restored with a rapidity which was unexpected in so impoverished a frame (*Bull. de thér.*, t. XIV., févr., 1838).

*Diseases of the skin.*—This liniment is also used with great benefit for the cruel itching which accompanies some dartrous affections.

Lime-water is used externally for the same purposes as the weak solutions of subcarbonates of sodium and potassium. It certainly has great power to heal old atonic ulcers, and to calm itching of the skin and of the genitals; as a gargle it is useful when the gums are soft or fungous, and the mucous membrane of the velum and the tonsils is the seat of old and sluggish inflammation.

*Diphtheria.*—Numerous experiments show that lime-water possesses a power of dissolving croupous false membranes, which is superior to that of the solution of potassa (one of the best solvents), but inferior to that of lactic acid.

*Vapor-baths.*—Caustic lime of commerce is used for vapor-baths, as follows: a piece weighing 1 or 2 kilogrammes (2—4 lbs.) is wrapped in a coarse cloth well moistened, and placed in the bed of the patient, the coverings having been first raised and supported on hoops. When the water begins to be absorbed by the lime, the temperature rises, it is converted into vapor, and if fresh water be added from time to time, very warm and abundant vapors soon arise, forming a genuine vapor-bath. By restricting the application to a part, a local vapor-bath is given.

By this simple and inexpensive method we have dispelled in a few days various rheumatic pains, especially lumbago and sciatica, which had resisted other treatment. It is, however, important that the patient should understand the action, so as to withdraw the lime when the heat becomes too intense, lest he be burnt. For further precaution, the lime should be wrapped in a thick cloth, doubled several times, and not too closely. A decoction of marshmallow or elder may be substituted for the water, if desirable.

## AMMONIA.

### *Effects of External Application.*

When applied to the skin, concentrated ammonia rapidly produces a sensation of burning, followed by redness, vesication, and at last a superficial eschar. This precious property has been of great use; we daily employ it in preference to hot water, burning alcohol, and other means,



the action of which cannot be so readily gauged. The same substance is also used in cases where we wish to produce transient redness of the skin. For the latter purpose we dip a piece of flannel in hartshorn and rub the skin hard with it. If the ammonia is from 18 to 23 degrees, five minutes are sufficient to produce the desired effect upon a fine and vascular skin; but if weak, or if the skin be thick or dirty, a much longer time is needed. The erythema thus produced rarely lasts beyond two hours.

For producing vesication, various methods are recommended. The part is rubbed with flannel or a piece of linen, till the skin is raised. This plan succeeds well, but is excessively painful when sensibility is normal and the derma is exposed at certain points. Some persons dip a piece of blotting-paper in hartshorn, but without result. We sometimes cut a compress of eight or ten layers of the desired size and shape, which we soak in ammonia of at least 12 degrees, putting on fresh as fast as it evaporates, so as to keep the compress saturated. A quarter of an hour usually suffices. But we often have to wait half an hour or an hour, no doubt because the volatility of the fluid rapidly deprives it of its effect. If the gas is retained by a fatty body such as oil, and more especially lard, vesication occurs more much more rapidly. Dr. Boniface has an excellent plan; he soaks a disk of agaric with ammonia and applies it by the spongy side; the impermeability of the other side prevents the gas from escaping, so that vesication occurs almost as quickly as if an ammoniacal liniment or ointment were used.

M. Bretonneau has long used a thimble or a small tin cup filled with carded cotton wet with ammonia. This device increases the activity of ammoniacal pomade, and we advise its use. It becomes of great importance when the exigency demands that not an instant of time be lost.

When we wish to use the ammoniacal ointment, we model with the spatula a little piece, which should not usually exceed the diameter of a franc piece. At the moment of application it produces a transient feeling of cold, to which a sense of warmth succeeds, and, after a few minutes, that of burning. This is by no means so painful as one might suppose, from the rapidity of the vesication; it is so slight that a real pain is never complained of. The epidermis is lifted in from three to fifteen minutes. The seat of the application and the strength of the pomade make a great deal of difference. We do not lift the pomade until we see a little red areola, which is a certain sign that the blister has begun to form; if left on longer, the pomade might produce a superficial eschar.

When the pomade is removed, the epidermis is sometimes seen forming a single bulla; if the bulla is divided into several cells, it is well to rub the epidermis a little to detach it more completely; the folds made by rubbing enable one to seize it and pull it off more easily. The exposed derma is pale red; if bright red and dotted with little ecchymoses, the ammonia has been applied too long, and a superficial eschar is the result.

Blisters with ammonia are usually made for the purpose of placing on



the denuded skin medicinal substances which are to be absorbed. After thus applying the drug, we lay a small piece of oil-silk upon it directly, in order to prevent the surface from drying up; it is afterwards covered with a piece of English taffety, which extends beyond the edges.

At the second dressing the surface is found covered with a yellowish-white false membrane, which sometimes projects above the level of the skin, or may appear sunken. This false membrane is always found when the dressing is applied as we have described it, varying only in the degree of thickness, which is always proportionate to the activity of the pomade, the duration of its application, and the time elapsed between the first and second dressing. This false membrane must absolutely be removed, as it hinders absorption.

During the first three days the false membrane formed, reproduced at each dressing, is easily removed; on the fourth and fifth, it is closely adherent to the derma, and has a sort of organization. About the sixth day nothing is seen but a reddish cicatrix, which, after a period of variable length, disappears entirely.

If the pomade is applied too long, a superficial eschar is produced which is hard to detach, and often leaves an indelible cicatrix. When we desire the caustic effect, we leave the ammonia in contact with the skin for half an hour or longer; but the result is much less rapid and certain than when potassa and lime in combination are employed.

The rubefacient action of ammonia is employed constantly to quicken sores and fistulas, to stimulate the skin for the relief of chronic engorgements, or rheumatic pains, or merely to provoke a derivative fluxion.

The cauterant effect has been used in *tic douloureux* by Herber, of Nestæsten, following the example of Thilenius ("Biblioth. méd.," t. XLIII., p. 102), and in toothache caused by caries. Gondret ("Considérations sur l'usage du feu et sur un nouvel épispastique," Paris, 1819) has used it, and with success, for cauterizing deeply the skin of the scalp, for the cure of chronic cerebral affections, incipient cataract, amaurosis, etc.

A little ammonia has been found a very useful ingredient of collyria for a large number of acute and chronic ophthalmias. The analogy induced Pringle to order it in gargles for angina, in the proportion of 15—40 grammes to 500 (gr. 230—460 to  $\frac{7}{3}$  xvi.). We have seen tinea treated by Gondret with very active ammoniacal lotions; a successful, but almost insupportably painful treatment. Girard, of Lyons, orders it diluted with water to prevent inflammation in burns; MM. Mérat and de Lens, for simple fluor albus, have added a little ammonia to the injection. Lavagna, on the contrary, produced a leucorrhœal flow from the vulva and vagina, which was quickly followed by the menstrual discharge. This was his treatment for amenorrhœa, and Nisato has found it valuable. The injection which he used was formulated as follows: milk, 500 grammes (1 pint); ammonia, 8—15 grammes (3 ii.—iv.).

M. Aran has often repeated the ammoniacal injections recommended



by Lavagna and Ashwell, and says that they have been followed by very remarkable results in the case of young virgins in whom the menses appeared slowly. He puts 10 or 12 drops in 30—45 grammes ( $\frac{5}{2}$  i.—iss.) of warm milk, and increases the dose by 5 drops a day until the irritant effect is hard to bear; in persons who are not irritable, 50 or 60 drops may be used. The injection is taken on going to bed, in such a position that the liquid is retained at least 10 minutes; they are repeated several days in succession, and sometimes twice a day.

But though ammonia, used topically, has restored the menstrual flow, La Pira regards it, when diluted with four parts of water, as a hæmostatic; and Girard, of Lyons, prescribes it in the dose of 4 grammes ( $\frac{3}{4}$  i.) to the litre of water (Oii.) as an injection in ulcerated cancer of the cervix, to destroy the odor, relieve the pain, and lessen the hæmorrhage.

Ammonia diluted with water forms a useful application in gout. M. Hutin, physician to the Hôtel des Invalides, used to have applied, to feet affected with acute articular gout, compresses dipped in the following solution:

Aqua ammoniæ.....	4	gram. ( $\frac{3}{4}$ i.).
Water.....	150	“ ( $\frac{5}{2}$ v.).

This is very soothing, and is quite in general use.

Ammonia forms a part of some celebrated cosmetics for stimulating the growth of the hair.

Aqua ammoniæ .....	3·54	gram. [gr. 54·6].
Essence of bitter almonds.....	3·54	“ [idem.]
Spirit of rosemary.....	28·33	“ [gr. 436].
Essence of mace.....	0·88	“ [gr. 13].
Rose-water.....	75·00	“ [gr. 1,157].

Mix first the essence of bitter almonds and the ammonia; then, after adding the essence of mace and rosemary, stir them together; add last, by degrees, the rose-water.

The external use of ammonia has been praised by some, including M. Ducros of Sixt, who place a brush filled with liquid ammonia on the mucous membrane of the pharynx in treating nervous asthma, capillary catarrh, whooping-cough and spasmodic hiccup. In some susceptible patients, the immediate inhalation of the gas which occurs at the instant of application causes a spasm of the glottis, so that respiration may be suspended for some seconds, and life seems in danger. This cauterization should be made at first with a very weak solution, and afterwards with concentrated ammonia. Some obtain the same results by cauterizing the vault of the palate.

In our opinion, the latter procedure ought to be generally adopted, because it gives exactly the same result without the same dangers.

In performing the cauterization we use a brush, which is first wet

with concentrated ammonia, and afterwards dipped lightly in water. Having ascertained by smelling that the vapor is not in excess, it is carried to the velum or arch of the palate, on which it is very rapidly painted. Three or four seconds suffice.

After a moment of anxiety and a fit of coughing followed by the expectoration of mucus streaked with blood, the patient recovers, and usually says that he is considerably better; the dyspnoea has disappeared, or, if there were any, the attacks of suffocation. In most cases, no doubt, the remission is only temporary, but it is nevertheless true that in some cases the attack of asthma is cut short; and some physicians claim to have obtained complete cures.

The simplest plan, and the one which we use most commonly, consists in keeping in the room a vessel of water containing some ammonia; this seems to be often of service in nervous asthma.

*Syncope*.—Ammonia, or rather its vapor, is used daily in cases of syncope, or when, after any cerebral trouble, the consciousness is long in returning. We need not speak of the great objections to the long continued inhalation of ammonia. It is proper to stimulate the mucous membrane of the nose and larynx by this remedy, but the observations of Majault ("Réflexions sur quelques préparations chimiques," etc.; Paris, 1779), those of Fourcroy ("Encycl. méth."), and of Percy (*Bull. de la Faculté de Paris*, 1815, p. 517), prove that so energetic and dangerous a remedy should not be entrusted to unskilled or careless hands, as is constantly done.

Sage, an observer worthy of some confidence, has quickly restored animals to life after asphyxia by carbonic acid, by making ammoniacal vapor penetrate the bronchi and nasal fossæ. Was recovery due to the fact that the nerves were simply stimulated, or that the carbonic acid contained in the air-passages was neutralized?

To obtain a less rude effect, the English have bottles containing muriate of ammonium and carbonate of potassium. The mutual action of these two salts is slow and disengages a small quantity of ammoniacal gas.

*Venomous poisons*.—The popularity of ammonia for the treatment of the bites of venomous animals is founded on the celebrated case of Bernard de Jussieu, which has been so ill observed and interpreted. Fontana, the most logical of toxicologists, and the most ingenious and skilful of experimenters, has in vain proved the puerility of Jussieu's observation ("Exp. sur le venin de la vipère"); in vain has he proved a thousand times that the bite of the viper and the stings of most poisonous insects rarely cause death; it is still believed that eau de luce and ammonia prevent the death of the few persons who take them. We have never seen the symptoms of poisoning by the bite of venomous brutes in any respect modified by the outward or inward use of hartshorn: and, far from sharing the opinion of Manglini ("Sul veneno della vipera," 1809), of Sonnini (*Journal de Physique*, 1776, t. VIII., p. 474), and of Sage,



we adhere to that of Fontana and Gaspard (*Journ. de phys. de Magendie*, t. I., p. 248), namely: that ammonia and its combinations, such as eau de luce, are at least useless, and even harmful when they give a false security and prevent the use of more efficient means.

### COMPOUNDS OF AMMONIA.

The principal compounds used in medicine are the carbonate, the acetate and the muriate of ammonium.

#### *Carbonate of Ammonium.*

This salt, a strong alkali, owes its therapeutic virtues to ammonia only. The dose is twice as large.

In England, this salt is used in cases of syncope and epilepsy, the patient being made to inhale it, with precautions; it is kept in a wide-mouthed bottle with ground stopper, and the salt is flavored with various aromatics.

Applied externally, carbonate of ammonium, like ammonia, may produce rapidly all degrees of irritation, from rubefaction to cauterization. Chaussier preferred it to Gondret's pomade, which loses its virtues in a few days (Mérat and De Lens: "Dict. de mat. méd.," t. I., p. 245).

Carbonate of ammonium is an ingredient in an American hair-wash:

Tincture of the leaves of myrcia acris..	140 grammes (2100 gr.).
Essence of laurel.....	1.77 " (27.2 gr.).
Bicarb. ammonium.....	28.00 " (432 gr.).
Borax.....	28.00 "
Rose water.....	1.13 litres (quarts).
Mix and filter.	

#### *Acetate of Ammonium.*

What we have said of the carbonate may be said of the acetate. We ought, however, to mention what Boerhaave, Cullen, Selle and many others have said of the spirit of Mindererus; all of whom, and our own contemporaries also, ascribe to the acetate a power of rendering the circulation, the secretions, etc., more active—a power which it shares with the volatile alkali (Cullen: "Mat. méd.," t. II., p. 366; Selle: "Obs. de méd.," p. 70). As to its effect in intoxication (Mazuyer: *Gazette de santé*, nov., 1826), upon migraine (*Ibid.*), and on the uterine pains which accompany the monthly flow, it seems entirely like that which we have already ascribed to ammonia. But the acetate has lately been used in quite a special way as a sedative of the uterine action. M. Patin has reported several observations showing that if given in cases of excessive or too frequent menstruation, or even in cases of hamorrhage from uterine cancer,

it lessens the amount or the frequency of the flow. In this case we give 15 grammes in the 24 hours, in four doses. The same authority has often found acetate of ammonia useful in cases of difficult and painful menstruation, causing the pain to cease and thus assisting the flow. From 50 to 72 drops may be given, divided into two doses and mixed with a glass of sweetened water. The first dose is to be taken as soon as the pains and malaises of the monthly period are felt; the second, if necessary, is taken half an hour later, and may be increased according to the severity of the symptoms.

He reports a case of nymphomania treated with great success by this remedy. Then he draws certain analogical inductions, to wit: that acetate of ammonia might be of much use to women who are inclined to abortion by the flow of blood towards the uterus which occurs in inflammations of the womb and the ovaries, and in organic lesions of those parts (*Arch. gén. de méd.*, t. XVIII., p. 217).

#### MURIATE OF AMMONIUM.

In the chapter on alteratives we mentioned the internal administration of this salt for the relief of catarrhal affections. We now study it from a very different point of view. In 1837, Fuchs of Göttingen attempted to apply it directly to the mucous surfaces. In 1838 and '39, he published an account of his success in treating chronic bronchitis by the inspiration of the vapor of muriate of ammonium, produced by throwing the salt upon heated plates. The treatment was introduced in France by Professor Lasègue, and then abandoned. Löwin of Berlin, thinking that this abandonment was due to a rude method, devised an apparatus for disengaging the substance in a nascent condition; the patient inspires at will, and in amounts which can be regulated, and is not suffocated by the vapor, as in Fuchs' procedure.

Löwin's inhaler is composed of three bottles of unequal size, the largest holding 120 grammes of distilled water, while the two smaller, containing each 60 grammes, are filled with muriatic acid and caustic ammonia respectively.

Libermann, physician to the military hospital of Gros-Caillou, brought this apparatus to our notice, and has used it since 1868. His conclusions are as follows:

The patient who uses the apparatus must begin by breathing moderately. He feels the vapor traversing his larynx, and giving rise to a sharp prickling. The first effect is a lively irritation of the mucous membrane, which increases the catarrhal secretions, but easily subsides by degrees. A part of the salt is absorbed and passes off by the urine. The circulation is accelerated; there is a feeling of heat, and even a little sweating and diuresis. The cough and the hyperæsthesia of the respiratory mucous membrane are quieted.



As a result of the treatment, the chronic granular angina which succeeds the inflammatory affection usually disappears quite soon. In herpetic angina, the inhalation gives a little relief, but does not cure. In chronic bronchitis it lessens the amount of the secretion and quickly dries it, but the stimulant nature of its first effects prohibit its use in acute tuberculous bronchitis. It has some efficacy in convulsive coughs and the various forms of idiopathic asthma (*Bulletin de thérapeutique*, 30 octobre, 1873).

Ruete of Göttingen considers sal ammoniac a powerful preventive of suppression of the perspiration of the feet, saying that in his experience it has proved infallible. In cases of suppression, particularly in gouty or rheumatic patients, who do not usually bear foot-baths well, and yet need to have perspiration re-established, he has always obtained the best results within a few days. He powders a stocking with a small spoonful of sal ammoniac and twice as much quick-lime; the patient puts on this stocking before going to bed, and wears it all night. In the lightest cases it suffices to repeat the procedure a few times; in obstinate cases the stocking must be freshly charged in the morning, to be worn all day.

In this mixture the acid of the salt combines with the lime, and the liberated ammonia must be considered the most active principle. An agreeable warmth is felt in the feet; a slight prickling, itching, and in a short time an abundant sweat ("Encycl. des sc. médic.: extrait des journaux allemands," 3e cahier, juillet, 1839).

### CHLORINE.

*Infectious diseases.*—The power which chlorine has of decomposing almost all organic products, and depriving them of smell, has led some physicians to think that it would neutralize morbid miasms and check epidemics. There is no kind of absurd falsehood and apocryphal or ill-observed fact that has not been published upon this subject; but we have very recent and sad experience of the uselessness of the remedy. At the beginning of the yellow fever which devastated Gibraltar in 1828, chloride of lime was thrown into all the sewers of the town and into the gutters, was placed in all the barracks, and given away to all the inhabitants. Terror made every one observe this regulation faithfully; and yet, three months later, there were scarcely 500 inhabitants that had not paid tribute to the epidemic. When the cholera invaded Paris and France, we know what vainly prodigal use was made of the disinfectant chlorides. As regards epidemics, chlorine and the chlorides are probably useless. We cannot deny their disinfecting power; but there are many persons to whom their odor is less tolerable than that of the smell they replace.

If chlorine and the chlorides used as disinfectants are useless in preventing epidemics, may they not have more valuable properties when ap-

plied topically, and when chlorine is brought directly in contact with organic matter charged with the virus? Experience alone could prove this, and facts must have great value.

It is said by most faithful observers that the plague is transmitted by the garments of those who have had the disease. Experiments made by the medical commission sent to Egypt in 1829 showed that such clothes, washed in water, macerated in a weak solution of chlorinated soda, and dried in the sun, may be worn next the skin with impunity. A little reflection will show how inconclusive such experiments are, and how ill-founded the conclusions which are claimed; for it is certain that a good washing in simple water renders the garments of plague-patients harmless.

*Hydrophobia*.—Chlorine and the chlorides are said to be capable of destroying the poison of rabies. Brugnatelli, in 1816, was the first to celebrate these properties with enthusiasm. He washed the fresh wounds with liquid chlorine, and gave it internally, in the dose of  $1\frac{1}{4}$  grammes for children (gr. 19) and 8 grammes for adults (3 ii.), four or five times a day during several weeks (*Journ. gén. de méd.*, t. LIX., p. 303). Other Italian physicians subsequently confirmed these statements (Arragoni: *Bull. de la soc. méd. d'émul.*, févr., 1823, p. 127). In France, M. Chevalier used it successfully for a student in pharmacy who had been bitten by a mad dog. Schönberg and Semmola (*Bulletin des sciences médicales* de Férussac, mai, 1828) testify to the same. Semmola claims to have cured nineteen persons who were bitten by dogs that were certainly hydrophobic. He washed the bites with chlorine diluted with water, and dressed them twice a day with a pledget of charpie soaked in the same. At the same time he gave chlorine for forty or fifty days, from 8 to 30 grammes (3 ii—viii.) three times a day, diluted with a proper amount of sweetened water. He gives a story which he thinks demonstrative. Three persons had been bitten; two underwent the treatment and had no symptoms, but the third refused, and died with hydrophobia twenty-three days after the bite. There is one grave objection to Schönberg's and Semmola's statements: "Are you sure," we might ask them, "that your careful cleansing of the bites was not a chief cause of the favorable result—and would not washing with pure water have had the same effect?"

In response to such objections M. Costa took a dog which presented all the symptoms of confirmed hydrophobia, and inoculated two well dogs with the saliva in five or six places, besides causing the other to bite them in several spots. Six hours later, the wounds of one dog were carefully washed in a solution of chloride of sodium in one-half its bulk of water, which was also injected to the bottom of the wounds. The other dog was washed with equal care, but in pure water. The results in the two cases were very different. The dog which had been treated with chlorine presented no sign of the disease, but the other died in thirty-seven days with all the symptoms of rabies (*Journal des progrès*, t. XIII., p. 233).



The fact reported, conclusive as it seems, proves nothing, except that lotions and injections made with an irritant substance such as solution of chlorine and the alkaline chlorides, may modify the virus in the wound and prevent hydrophobia.

Such a conclusion would not seem justified if it were not for large numbers of facts, which have been collected by Trollet "*Recherches sur la rage*," and Stanislas Gilibert ("*Compte rendu de la société de médecine de Lyon depuis 1812*"), and which unhappily disprove the great promises of Brugnatelli and those who held his views. It would certainly be culpable to neglect certain and heroic means in favor of a treatment which may have been successful, but which is so much in dispute.

*Variolæ*.—With more reason and success, Gubian of Lyons washes the surface of the body in confluent variolæ with chlorinated water, at the period when the pus begins to be fetid (*Journal de chimie méd.*, t. VI., p. 316); Boyer of Marseilles injects it into the cavities of large abscesses which keep up a resorptive fever (*Gaz. méd.*, 1834, p. 196); that Récamier ("*Leçons orales de clinique*"); Deslandes ("*Nouv. biblioth. méd.*," t. VIII., p. 151) pass chlorinated injections into the uterus when the placenta or any mass is putrefying in the cavity of the organ. For the same purpose, Reid of Dublin gives injections and washes of chlorinated lime or soda to change the odor of the dysenteric stools and lessen the inflammatory irritation of the mucous membrane of the large intestine. Cottereau and Chevallier also recommend, in order to destroy the smell of pus in ozæna, and to cleanse ulcers of the pituitary membrane, the inhalation of chlorinated powders or liquids.

### HYDROCHLORIC ACID.

*Ulcers*.—Liquid hydrochloric acid, the only form which is now used in medicine, is one of the most common caustics; the eschar which it causes is superficial, and the sore which follows the fall of the eschar cleans rapidly. Internally it is an irritant and powerful poison.

This acid was lauded by Boerhaave, Van Swieten, Marteau, Granvilliers, but was hardly used in our time until Bretonneau of Tours called attention anew to its useful properties, employing it in pseudo-membranous diseases of the mucous membranes to produce superficial cauterization (see "*Traité de la diphtérie*"). He directs that the acid shall be fuming. He observes that this acid, like most mineral acids, coagulates the albumin which enters into the secreted mucus, and which also produces a pellicular inflammation which must by no means be confounded with that of which we desire to prevent the formation, the reproduction, or the extension. An error of this sort led M. Baup to say that hydrochloric acid propagates diphtheritic inflammation. The same acid is used topically by the illustrious practitioner of Tours to combat certain chronic scaly diseases of the skin.

Some years ago Ricord made at the Hôpital des Vénériens a successful application of concentrated muriatic acid to the treatment of mercurial ptyalism. He had remarked, as many others had done, that the salivation did not depend, as was said, upon a direct irritation of the salivary glands by mercury, but upon the inflammation of the gums, which, whether mercurial or not, always gave rise to salivation. He considered that the treatment ought to be directed entirely towards the preventing the mercurial inflammation of the gums. As soon as he sees the gums of the lower incisors begin to swell, he cauterizes them straightway with fuming muriatic acid, and repeats the operation once every day until the inflammation is dissipated. He performs the operation with a little brush, which he passes lightly over the gums, taking care to avoid the teeth.

In sanious ulcers of the tonsils, the gums, the cheeks, in aphthæ, or muguet, muriatic acid, pure or mixed with half its weight of honey of roses, rapidly cleanses the mucous membrane. It has been used with equal success in hospital gangrene, a disease accompanied by diphtheritic and pultaceous exudations quite analogous to those which are developed on the mouth and tonsils (see for quotations, Gmelin: "Apparatus med.," pars II., vol. i., p. 53).

Some physicians have recommended for chilblains lotions made with a mixture of muriatic acid and water (Linné, quoted by Gmelin, loco supra dicto; *Journ. de Vandermonde*, t. VII., p. 154). This means has seemed to us quite efficacious in general. Rowley reported the cure of erratic gout by placing the feet in a bath acidulated with hydrochloric acid ("Treatise of the regular, etc., gout," London, 1792). Plueck professes to have cured an obstinate tinea with a pomade composed of one part of muriatic acid, one of ointment of althea, and four of juniper ointment (Vide Gmelin, p. 55, l. c.)

Internally, muriatic acid has been recommended as an antiseptic, under the same circumstances as chlorine; or as a temperant, under the same conditions as other acids (see t. II., "Médicaments sédatifs").

The acid was used as a disinfectant long before chlorine; Guyton, of Morveau, in 1773 first used it by fumigation to disinfect the tombs of Dijon and the dungeons of the city prison, where the mortality was great.

*Mode of administration and doses.*—The acid may be used concentrated; it is commonly mixed with honey or water, in proportions so variable that it is impossible to indicate them here. For foot-baths, from 125 to 250 grammes ( $\frac{5}{8}$  iv.—viii.) are usually put into 6 or 8 quarts of hot water.

#### ALKALINE CHLORIDES.

Javelle's water has long been used in the arts for bleaching; it was generally known in 1789. Percy is said (*Revue médicale*, 1826), but on very questionable authority, to have used it in the army of the Rhine, in 1793, for hospital gangrene.



Chloride of lime was named by Guyton de Morveau, in 1801, as a disinfectant (l. c.), and in 1803 by Alyon (*Annal. de chimie*, t. LIII.), as a preventive of contagion.

But the first authenticated use of chlorides plainly belongs to Masuyer, of Strasburg. In his "Observations sur la maladie dite fièvre des hôpitaux," published in 1811, he describes the property possessed by chloride of lime, of slowly disengaging chlorine; by means of which he disinfected the air of hospital wards. The writings of Gimbernath, Bories, and Pâtissier followed; and Labarraque subsequently described most distinctly the disinfecting powers of the various alkaline chlorides.

Labarraque did not actually demonstrate the disinfecting powers of the chlorides, but by his enthusiasm (perhaps exaggerated) he compelled physicians to use them in all kinds of internal and external diseases. In the years 1825, '26 and '27, they threatened to carry by storm the whole of surgical therapeutics, whose walls had been breached by the school of the Val-de-Grâce; but by degrees the fashion passed by, and the chlorides fell into their proper place.

We have no more to say of the chlorides as disinfectants, but will confine ourselves to properties which are not solely due to chlorine.

The chlorides, in virtue of their great alkalinity, have been used externally, and have properties like those of solutions of carbonate of sodium and potassium, and lime-water. This is probably the explanation of their numerous applications in surgery.

In urethral blennorrhagia, and more especially in that of the vagina; and in leucorrhœa caused by inflammation of the neck of the uterus or a chronic inflammation of the vaginal mucous membrane, injections of chloride of lime, sodium or potassium are useful for the same reason as alkaline solutions (Daumas: "Thèses de la Faculté de Paris," 1825, No. 120; Blache et Jolly: "Dict. de méd.," 2e éd., t. VII., p. 431).

In pruritus of the vulva (Darling: *Med. Repository*, Feb., 1826), in superficial herpetic affections (Alibert: "Nouv. élém. de thér.," t. II., p. 453), in itch (Derheims, Fontanetti: "Hospital Transact. Med.," t. X., p. 385; *Journ. des conn. méd.*, t. I., p. 233), in some diseases of the scalp (Chevalier: "Art de préparer les chlorures;" Roche, Cottureau: *Ibid.*); the alkaline chlorides possess neither more nor less virtue than the solutions of lime, potassa, or soda, which are generally successful in such circumstances.

It is probably due to the same property and mode of action that the chlorides act favorably, not only on blennorrhagic ophthalmia and urethral blennorrhagia, but also on scrofulous, and even epidemic, ophthalmia (Varlez: "Dict. de Mécat et de Lens," t. II., p. 359; Guthrie: *London Med. and Phys. Journal*, Nov., 1827; Hiesberg: *Gaz. méd. de Paris*, 1831, p. 183).

In the above affections, the chlorides probably owe their value to their alkalinity. Whether this is true also in the diseases we are now about to mention, is a matter for observation to decide.

Lisfranc, one of the strongest partisans of the chlorides, who has used

them with great benefit for chronic ulcers, attributed to them a special efficacy in the case of burns; saying, with Dupuytren, that no treatment was more effective in burns of the second or third degree; but the experience of others by no means confirmed their statement, and the two claimants for the honor of the discovery have themselves given it up.

In the treatment of hospital gangrene, and diphtheritic and pultaceous inflammation of the mouth, which so often causes fatal gangrene of the cheeks in children, the treatment by chlorides has proved very successful, according to Percy (Mérat et de Lens), Darling (l. c.), and Roche (see Chevalier) and Bonneau, physician to the Children's Hospital at Paris, (Blache: "Diet. de méd.," 2e édit., t. VIII., p. 434). The latter uses exclusively the dry chloride of lime. He commonly takes a piece of paper, rolled up, wets the surface by dipping it in water, then dips it into a bottle of the chloride, and passes it, covered with powdered chloride, over the affected parts. After a minute or two he causes the patient to gargle in order to get rid of the chlorine, which might irritate the neighboring parts.

Dr. Hervieux has very recently proved the very remarkable efficacy of a dressing of chloride of soda, diluted with three, four or more parts of water, according to the irritability of the part, and applied on pieces of sponge to ulcers of bad character.

M. Siméon proposes chlorine in poisoning by hydrocyanic acid, the chlorine combining with the hydrogen and setting free cyanogen. Orfila finds the antidote very effective; he uses a mixture of four parts of water and one of solution of chlorine. Mialhe prefers to pass under the patient's nose a compress wetted with vinegar-water into which chloride of lime has been put.

### SILVER.

Solutions of nitrate of silver have been used locally and with success in inflammation of all the mucous membranes—as the conjunctiva, the nasal fossæ, the pharynx, the mouth, the vagina, cervix uteri, urethral canal, and bladder. Chronic inflammations within the cavity of the neck of the womb or on its surface are particularly benefited by nitrate of silver, solid or in solution; especially in cases of erosion, granulation or ulceration, accompanied by an abundant muco-purulent discharge, or loss of blood, which often fatigues or exhausts the patient.

Many acute inflammations are similarly relieved, as diphtheritic angina, croup, catarrhal angina, œdematous angina, acute blennorrhagia, the most intense blennorrhagic ophthalmia, purulent ophthalmia and dysentery.

A somewhat severe attack of quinsy may very often be aborted by cauterization with the crayon or the concentrated solution, provided the application be made at the beginning. At a later period the same application may shorten the duration of the disease. The relief is almost immediate; the pain and difficulty in swallowing subside almost instantly.



In order to make the cure complete, it is sometimes necessary to repeat the cauterization once or twice, at the interval of twelve or twenty-four hours. The same treatment is used successfully in scarlatinous angina of the tonsils, with the effect of cutting it short or at least diminishing considerably the symptoms, when they threaten to become unusually grave, owing either to excess of inflammation or to a complication with diphtheria.

At the beginning of a cold, Tessier, of Lyons, uses with success a weak solution of nitrate of silver as an abortive; it is spread repeatedly over the nasal cavities.

For the skin, when in consequence of inflammation it is converted into a highly vascular membrane (as the surface of ulcers); in fistulous passages; in the various chronic cutaneous affections, the topical applications of nitrate of silver are very often successful; and in a great many cases of skin diseases it was Alibert's principal remedy.

It appears, therefore, that nitrate of silver has been used with benefit in the majority of inflammations of the skin or the mucous membranes. Yet we may say that it is best indicated, and shows its curative powers in the highest degree, in specific inflammation and ill-conditioned sores, or generally in diseases which do not proceed frankly to resolution. It is in general use for venereal inflammations. Acute vaginitis is now attacked vigorously with the crayon, or preferably with more or less concentrated solutions, which are painted over the whole surface of the vulvo-uterine canal. In certain forms of blennorrhagia in men, quite strong injections are in very frequent use; but if the disease is limited at first to the fossa navicularis, cauterization with the crayon often causes it to abort, according to Cahen.

Nitrate of silver incorporated with lard was long ago used in certain ophthalmias of the lids. Jobert (de Lamballe) used it locally in the erysipelas and the inflammation of the lymphatics and veins which follow wounds and surgical operations. He believes that surgical erysipelas does not differ from that due to internal causes, both being dependent on a special condition of the system. He further thinks that the local manifestation of the general condition deserves the most serious consideration, and that, while seeking to reclaim the general condition, we must at any cost extinguish the erysipelatous region, which, after great operations or wounds, is sufficient to cause death. He has a pomade containing one or two parts of nitrate of silver to four of lard, which he spreads twice a day over all parts of the skin that are attacked or threatened with inflammation. This ointment blackens the parts, and causes a strong sensation of burning, with a very acute vesicular inflammation; but the erysipelas usually disappears, and is fixed in the region where the inflammation caused by the ointment exists. The nitrate of silver ointment is now preferred by some to croton oil for producing local inflammations; but it gives a very disagreeable color to the skin, and an indelible stain to the clothing.

In pruritus of the vulva, that so troublesome and so obstinate disease, almost always due to a herpetic irritation of the skin which spreads to the mucous membrane of the labia and vagina, washes, cauterizations or injections with a solution of nitrate of silver render more marked service than calomel and sublimate.

In eruptive diseases, including small-pox, impetigo and zona, several practitioners have followed the advice of Bretonneau of Tours, and directed a light cauterization of the derma on which the pustule or bulla is situated with nitrate of silver, in order to produce abortion of the local inflammation.

A superficial application of nitrate of silver causes large granulations upon the surface of ulcers to disappear very rapidly. Ducamp applied the analogy to the treatment of engorgements of the mucous membrane of the urethral canal; and the value of this remedy is now well known. We have used the same treatment to produce resolution of chronic engorgement of the tonsils; and have thus often cured an affection for which the only resource used to be extirpation.

Contractions of the nasal duct, the internal and external auditory meatus, the nasal fossæ, and even the lower part of the rectum, have been cured by this treatment, which must be governed by the condition of the parts, the severity and duration of the disease.

We might speak of the value of local applications of nitrate in superficial ulcerations of the cornea, the buccal mucous membrane, the glans, prepuce, etc. It would be impossible to quote the multitude of cases in which it has been used; there is no agent in medicine that is more frequently used. But we may sum up by saying, that it is of very special service in a great many acute or chronic inflammations of the skin and mucous membranes; its efficacy in these cases is so well established that it deserves the name of the antiphlogistic caustic.

#### SUBCUTANEOUS INJECTIONS OF NITRATE OF SILVER.

Until very lately, the use of irritants as revulsives has been confined to the coverings of the body—the skin, mucous membranes, membranes of the bladder, etc. A distinguished physician of Rheims, M. Luton, has introduced these agents into the subcutaneous cellular tissue, and even the parenchyma of the viscera. He gives to this method the name of parenchymatous substitution (*Acad. des Sciences*, 28 septembre, 1863). He has employed many irritant substances—solution of chloride of sodium, alcohol, tincture of cantharides, of iodine, etc.—but he prefers to all these the solution of nitrate of silver, one part to five or ten. When first injected, it causes a severe pain, which grows less during the day, so that the patient can almost always sleep on the following night. The pain is usually less on the next day, but soon reappears; and a boil is formed which almost always has to be opened from the eighth to the tenth day.



The discharge is at first a sanious, blackish, thin pus, containing rags of mortified cellular tissue; it afterwards improves and the abscess heals. When only a few drops are injected, a regular furuncle is developed.

This method, then, gives pain for ten days. But if we consider that most of the affections for which it is used threaten to last a long time, or had produced atrophy of the limb (as sciatica), we shall not find the price too high to pay. For neuralgias of the face and trunk the case is not quite the same, and there are few who would care to risk a phlegmon of the face.

Thiersch, pursuing his method of injecting modifying substances into tumors, employed for cancers a solution containing 2 parts of nitrate of silver to 1,000 of water: and then, to prevent the diffusion of the caustic (though probably there is no need to fear it), he used a second injection of chloride of sodium containing 1 part in 1,000 of water. The silver injection amounted to 30 or 40 grammes (3 viii.—x.) of fluid; that of common salt, to 15 or 20 (3 iv.—v.). His intention was to impregnate the elements of the neoplasm and produce atrophy. He pierced the tumor in all directions, to reach as much tissue as possible. This painful operation required the employment of anæsthesia by chloroform. It gave small results, and Thiersch afterwards proposed to make the injection by the arteries (*Wiener Wochenschrift*, June 26, 1867).

The indications and rules for the use of nitrate of silver are given in the chapter on irritants.

### SULPHURIC ACID.

*Sciatica*.—The treatment of sciatica by sulphuric acid originated with Legroux of the Hôtel-Dieu (*Bulletin de thérapeutique*, septembre et octobre, 1852). It has replaced with advantage the cauterization by hot iron, the accompaniments of which are always terrifying. His example has been followed by some others, among whom may be named Loiseau of Paris, H. Gintrac of Bordeaux, Dubourg of Marmande, and we have often used it ourselves. The method usually causes the successive disappearance of all the painful points, and in a short time the majority of the patients are cured, and the rest markedly improved. This result is the more valuable, as sciatica is notoriously the most obstinate of all neuralgias.

Legroux's method, which we also follow, is thus described.

One or two tablespoonfuls of commercial sulphuric acid are put into a plate; a piece of cotton wadding is dipped into it, and the painful portion of the sciatic nerve is stroked with the cotton from above downwards. This leaves a stripe about 3 centimetres broad ( $1\frac{1}{8}$  inches), and of a length proportioned to the number of painful spots. If the whole length of the nerve is abnormally sensitive, we do not cauterize all at once the whole length, but only one-third or one-half of the most painful part, to avoid too extensive a burn. We also avoid covering the bony prominences, in

order to leave the patient free points for his body to lie upon. If suppuration ensues, we find it well to dress with an astringent solution, usually of tannin, which coagulates the gelatine produced by the cauterization.

*Sebaceous tumors.*—Specialists have long competed with surgeons by the announcement that they cure tumors with caustics instead of the knife. If the word “tumors,” which is far too general and pretentious, be replaced by “sebaceous tumors,” it will give the truth. The things which are removed by acid caustics are wens and lipomata.

When we can see over a lipoma the point formed by the closed orifice of the follicle, the destruction of a small portion of skin at that point will suffice for the removal of the cystic pouch; but when, as is most common, the point is not visible, the whole or a great part of the skin over the tumor is destroyed. As the cyst has hardly any attachment except that to the skin, from which it receives its vessels, it shrinks after the operation, and is cast off with the eschar. There is sometimes a difficulty. The hairy scalp is one of the favorite seats of the disease; when the tumor occupies that situation, it may become adherent to the pericranium, and remains so when the eschar is detached. This complication may be foreseen, for it is easy to learn beforehand whether or no the tumor is fixed by its lower surface; and there will be no serious obstacle if the adhesions are slight, as they may be destroyed with the scissors without much risk.

Dr. Chairou, physician to the convalescent hospital of Le Vésinet, prefers as an acid caustic the “pâte safranée-sulfurique” of Velpeau, which he uses for extracting sebaceous tumors as M. Gillet of Grandmont uses chromic acid. His results were communicated to the Société de Chirurgie (November 10, 1869), and reproduced in M. Neyreneuf’s thesis. He has extracted 33 sebaceous cysts from 11 persons. The eschar generally fell from the 10th to the 35th day; the sore was dressed with a simple piece of dry charpie, and healed in a few days.

## ZINC.

We shall speak hereafter of oxide of zinc, which we have classed with antispasmodics in accordance with the custom of most of our predecessors, though we, for want of conclusive experience, are not able to affirm positively that such are its powers.

We shall review briefly first the soluble preparations, the chloride, sulphate, and acetate of zinc, and afterwards the insoluble preparations, the oxide and carbonate.

Chloride of zinc is used internally as an antispasmodic; it is dangerous, and less useful than the other preparations of zinc. We shall give our chief attention to its external use. It is caustic, but in a less degree than those which we shall mention. When applied pure and in powder to the epidermis, it inflames it, and in six or seven hours causes a grayish



eschar, which is detached a little more quickly than those produced by caustic alkalies. This caustic property has been utilized by some modern physicians. Hanke of Breslau used it to destroy *nævi materni*, fungus hæmatodes, malignant pustules, and syphilitic ulcers of carcinomatous appearance (*Bulletin des sciences méd. de Férussac*, t. X., p. 74; *Journ. de pharmacie*, t. XVI., p. 549). More recently M. Canquoin, who pretended to possess a secret remedy for cancer, was obliged to publish it after it had ceased to be a secret; but from that time, the famous remedy worked no more miracles, and was forgotten as soon as known. His caustic paste has little effect upon skin covered with epidermis, which must be first stripped off by the aid of ammoniacal ointment; the paste is then applied for one or two days according to the depth to which it is desired to cauterize the tumor. This method is very slow, and is so horribly painful that the most courageous often refuse to have it repeated.

We cannot here discuss the comparative advantages of the caustic method of treating tumors as compared with that by the knife. We will only name the writings of Estor ("De la méthode cautérisante," in *Journal de la société de médecine pratique*, 1840); of Girouard ("Étude pour le chlorure de zinc," *Revue médico-chirurg.*, 1844); of MM. Salmon and Maunoury (*Gaz. médicale*, 1859); and the "Thèses of the Faculté de médecine of Paris," sustained by MM. E. Bonnet (1843), Hardy (1853), Vieillard (1856), Fontagnères (1869), Simbal (1874), and Philippeaux's "Treatise on Cauterization."

We shall restrict ourselves to a mention of the procedures which have been retained by surgeons.

Fistulas of various kinds are daily treated at the Val-de-Grâce by M. Gaujot, with arrows of chloride of zinc, as recommended by MM. Salmon and Maunoury.

Maisonneuve does not destroy the tumor from without inward, but forms a sort of trench between the affected and the healthy portions by pushing in fragments of chloride of zinc paste, cut into "arrows," or triangular pieces, each measuring a centimetre or a centimetre and a half at the base, and 10 to 15 centimetres (4 to 6 inches) in length. As this substance has little action on the skin, a puncture is first made, which is pushed as deep as the limits of the lesion, if possible. The blade of the bistoury is then withdrawn, and in its place is inserted an arrow, which is broken off at the level of the skin. The arrows are thus placed like the spokes of a wheel or the slats of a Venetian blind, with intervals of only 2 centimetres (0·8 in.), which is sufficient to enable the adjoining arrows to destroy the tissues between them.

In two or three hours the action of the caustic is marked by a little grayish line surrounding the base of the arrow. In six hours this space has a breadth of about 2 millimetres (0·08 in.); and, in 36 hours, of one centimetre (0·4 in.). During this time the arrow softens, but does not become fluid. When well formed, the eschar is surrounded by a line of demarcation which increases by degrees, but never exceeds 1½ or 2 centi-



metres (0·6—0·8 in.). Elimination begins at the fifth day; and, if the arrows have been well placed, so as to form a complete trench, the tumor falls on the eleventh day.

It is remarkable that the chloride of zinc prevents the tumor from putrefying, but embalms it, as it were. The sore left by the fallen eschar is red, covered with granulations, and quickly heals if it rests on a completely healthy tissue.

Professor Richet (*Gaz. des hôp.*, juillet, 1869) has proposed to treat sebaceous cysts by injecting into their interior a very small quantity of a solution of chloride of zinc by a subcutaneous syringe. On the third day the hole made by the needle becomes more distinct; it is marked by a small crust, which increases by degrees; from the eighth to the twelfth day it is large enough to enable us to enucleate the tumor by simple pressure.

*Nitrate of zinc*,  $\text{ZnO}, \text{NO}_5, 3\text{HO}$ .—This salt has lately been proposed as a substitute for the chloride by M. Latour, chief apothecary at the military hospital of Lyons. It is obtained by the reaction, in the warm, of nitric acid diluted with its own bulk of water, upon commercial zinc in excess. The filtered liquid is evaporated by a gentle heat until a slight ebullition is produced, which shows that the necessary point of concentration is reached; and the liquid is allowed to cool.

For a paste analogous to Canquoin's take 2 parts of saturated solution and about 1 part of flour.

*Oxide of zinc*.—The oxide and carbonate are used externally in ointment or powder, for chancreous, fetid, etc., ulcers, fissures of the breast and lips, intertrigo of children, chronic ophthalmia, and coryza; suspended in mucilaginous water, they are used for leucorrhœa, blennorrhagia, etc., etc. The amount used is nearly unlimited.

*Sulphate of zinc*.—The sulphate, carbonate, oxide and acetate of zinc have been used internally as antispasmodics. But all of these have been chiefly used as local remedies, and all fulfil nearly the same indications; though the soluble preparations are in general very irritating, and must only be ordered in very small doses, while the carbonate and oxide may be used in much larger doses.

Sulphate of zinc internally is used only as an emetic, which, according to the experiments of M. Toulmouche, of Rennes, is more certain than tartar emetic, and may be compared with sulphate of copper. It is given for this purpose in the dose of 40—75 centigrammes (gr. 6—12) dissolved in 100—125 grammes ( $\frac{3}{4}$  iii.—iv.) of water. This is much used by our neighbors beyond the water, and perhaps we should do well to imitate them; it is especially adapted to cases of poisoning, as it produces vomiting more promptly and much more surely than tartrated antimony: in this case it is given in a somewhat larger dose than that just mentioned; and, if the poison is a narcotic, twice or three times as much should be given.

Aran, following Baly, recommends sulphate of zinc as useful in the constipation of nervous persons.—Sulphate of zinc,  $\frac{1}{4}$  gramme (gr. 4);



bread-crumbs, q. s.; f. pil. xii. and silver them. One pill directly after eating; from 3 to 5 a day, or more.

Sulphate of zinc is given very often externally. In acute and chronic catarrh of the mucous membranes, it is useful to place it in contact with the diseased surfaces. In conjunctivitis, nasal catarrh, and urethritis, it is used in the proportion of from 1 to 10 or 20 centigrammes (grs. 0·15—3) to 30 grammes (8 ounces) of distilled water; in leucorrhœa, it is injected in the dose of 2—8 grammes (grs. 30—120) to 500 of water (1 pint); the same in gargles for chronic throat complaints.

Lasègue gives it as an injection in dysentery—3 grammes to 250 of water (gr. 45— $\frac{7}{8}$  viii.); he calls this his intestinal collyrium.

A one per cent. solution of the sulphate is by far the best local remedy for blennorrhagia after the acute stage. It may be given when the discharge ceases to be purulent, and becomes mucous and catarrhal. This may be recognized by the fact that while purulent, the discharge is not adhesive; but, as soon as it becomes mucous, it sticks to a piece of cloth, and may be drawn out in a thread, of a length proportioned to the amount of mucus present.

A cloth is not always necessary, for when the patient uncovers his glans the liquid, adhering to the prepuce, may form one or more threads of mucus. We can then say that recovery is not distant, and may soon be attained by the use of sulphate of zinc. The same phenomenon may be noticed at the close of purulent ophthalmia in children or adults.

It is added to baths, in the amount of 60—120 grammes (nearly 2—4 ounces) to relieve the itching caused by prurigo, chronic eczema, and, in general, by the herpetic affections.

Sulphate of zinc, closely united with alum, by fusion in a porcelain capsule, was lately presented by Dr. Richard of Soissons, as one of the most prompt and certain means of relief for pruritus pudendi; as these substances are both valuable when used separately, we may believe that when combined, they acquire a still higher efficacy. They form a new remedy, not to be neglected in so troublesome and often obstinate a complaint.

*Acetate of zinc* is never used internally. Externally, it has exactly the same use as the sulphate. Dr. Pujet employs the solution as a topic, giving it in baths, or leaving it in contact with the skin for one or several hours.

Zinc, exposed to the air and used for roofing or gutters, forms with the rain only a small amount of an insoluble salt; and the same is true of the tanks of zinced iron which are used in the navy. The water kept in such tanks is very limpid, and that collected on zinc roofs is also very healthy (Bouchardat and Fonssagrives, *Bull. de thér.*, 1864, t. LXVII., p. 70).

For Valerianate of zinc, see Valerian.

## COPPER.

METALLIC copper is no longer used in medicine; a few salts represent it, namely: ammoniated copper, the diacetate, the subacetate, and the sulphate.

*Ammoniated copper.*—This is mostly used externally, yet it has been given by some for epilepsy in the dose of 10–50 centigrammes (gr. iss.—viii) daily. It is regarded by Dr. Mercy, physician to the Children's Hospital at Pesth, as an almost infallible specific for St. Vitus' dance. He combines 40 centigrammes (gr. 6) of the salt with 100 grammes (3 xxv.) of mint-water and about 30 grammes ( $\frac{3}{4}$  i.) of simple syrup, to which he adds 6 or 8 drops of tincture of opium, to assist toleration. A child of six years receives of this two teaspoonfuls four times a day, which dose is rapidly increased, if the stomach bears it, till 40 centigrammes of ammoniated copper (gr. 6.) are taken daily. He states that among more than 200 cases he has almost always seen the chorea depart so quickly that the relation of cause and effect has been unmistakable.

Placed in contact with the skin and mucous membranes, it causes a violent irritation.

It forms the *eau céleste* so much praised in the treatment of chronic ophthalmia, for which purpose it is used in the proportion of a few drops to the ounce of distilled water, increasing the proportion as the sensibility of the conjunctiva diminishes. It has been of equal use in blennorrhagia, leucorrhœa, and chronic ulcers. M. Cullerier makes a mixture of 28 grammes of ammoniated copper with 4 of nitrate of mercury to touch venereal ulcers which resist mercury.

It is not used internally; externally it forms an ingredient of a great many ointments and powders, formerly of much celebrity in the treatment of ulcers and chronic diseases of the skin. Dissolved in water in various proportions, it is, like the sulphate, of which we shall presently speak, useful in chronic ophthalmia, blennorrhagia, syphilitic or simple ulcers, dartres, and especially eczematous dartres.

*Subacetate of copper*, verdigris of commerce (*æs viride*, *viridis æris*, *ærugo rasilis*) shares all the poisonous, irritant, purgative and therapeutic properties of the diacetate of copper.

In pharmacy it is used in a multitude of plasters and salves, which are not without use in external diseases.

It has been given internally. It formed the essential element of the famous Gerbier's cancer-pills, which cured some patients as long as the composition remained secret, but have been found completely inefficacious by experience. It has been recommended in rickets and scrofula, but the facts are so inconclusive that we pass over them.

*Sulphate of copper* is a very powerful irritant poison. It forms the most certain emetic we know of, in the dose of 25–40 centigrammes (gr. 4–6). It has been thought especially valuable as an emetic in croup.



The recent observations of MM. Godefroy and Mavel would seem to show that the frequent use of a solution of sulphate of copper is very rapidly beneficial in malignant angina. A spoonful is given every ten minutes of a solution containing 10 centigrammes in 125 grammes of distilled water (gr.  $1\frac{1}{2}$ — $\frac{2}{3}$  iv.). We have seen two very severe cases where we thought the disease had been cured by this remedy.—We consider this a case of substitutive medicine, like the use of calomel, alum, or nitrate of silver.

We have lately given sulphate of copper in the dose of  $\frac{1}{2}$ —1 gramme in an injection for chronic diarrhoea, and we often find it very useful, in very much the same way as nitrate of silver is. The solution of sulphate of copper is also used (2 grammes to 500 of water) for catarrhal leucorrhœa; injected morning and evening.

The sulphate, as a collyrium, is used in the proportion of 0.05 to 30 grammes ( $\frac{1}{6}$  of 1 per cent.); it is still prescribed under the name of eau céleste or pierre divine.

*Diacetate of copper* (deutacetat cupri, crystallini veneris) when in contact with a mucous membrane, or the skin deprived of its epidermis, produces a very active irritation: it is a very powerful poison.

#### ANTIMONY.

Antimonial ointment is rarely used as a revulsive for two reasons: the inflammation cannot be restricted to the superficial part of the skin, and it leaves horrible scars. The application is made upon the chest; and when the patient is a little girl, we leave upon her a mark which she may find very undesirable.

*Sebaceous cysts.*—The attempt has lately been made to cure these without a visible scar by tartrated antimony. The disease is innocent, but is almost always seated in some exposed part, usually the head or face. The patient is urgent in his request to be relieved of the disfigurement—but he also insists on being cured without risk and without a noticeable scar, since otherwise the remedy might be worse than the disease. Caustics may be used without danger; we have given directions for the use of Vienna paste, sulphuric acid, nitric acid, chromic acid, chloride of zinc.

One of the simplest methods of using tartarized antimony has been popularized by M. Boeckel. The method consists in injecting a solution of one part in 30 of the salt into the tumor with a Pravaz syringe. When the tumor is not larger than a hazel-nut, he punctures it with the needle of the syringe, turning the latter about so as to divide any septa that may exist; then, if very sure that the point is in the cyst, he injects about one gramme of the solution (gr. 15). It is necessary to avoid piercing entirely through the cyst, as, if the fluid were injected into cellular tissue, it might cause a phlegmon.

When the injection is well performed, and we are sure that no fluid

has passed into the connective tissue, the tumor seems, directly afterwards, to be increased in bulk. The opening then cicatrizes. On the next day, and afterwards, the skin over the cyst is slightly reddened, and the inflammation increases until the third day. On the fourth or fifth day the puncture opens again and discharges a small quantity of pus mixed with a little blood and more sebaceous matter. On pressing the tumor, the contents are easily pressed out; the entire sac, when it does not come out easily, is grasped with a forceps or hook. A little pus escapes for two days more, and on the eighth day all is healed.

The author of the treatment faithfully records the accidents. In one case, where the tumor was seated at the level of the eyebrow, the cellular tissue of the lid was inflamed and several incisions had to be made. In two other cases the pouch did not come out, but the improvement was considerable (Greuell: "Thèse de Paris," No. 359, 1872).

### MUSTARD.

Two species of mustard, the white and the black, have been used in medicine; the white is preferred for internal use, the black almost exclusively for external use.

*White mustard, sinapis alba.*—When a remedy is popular, when quacks have long used it, and always with advantage, it must have some valuable properties, which the obstinacy or ill-humor of physicians may deny in vain.

The use of mustard-seed in medicine goes back nearly to the last century; Cullen states it most positively ("Mat. méd.," t. II., p. 180); he used it as a laxative. Maccartan, an Irish physician residing at Paris, published in the *Journal général de médecine* (t. XXXIV., p. 72, 1809) a paper on its therapeutic properties; this had no influence on practice, because his facts would not stand examination. Nevertheless, in England and North America the use of white mustard-seed had become popular, and a few years later it was so in France. From our own observations we can state that this is a very useful remedy.

Cullen remarked its laxative effect. It purges in the dose of 30 to 45 grammes ( $\frac{3}{4}$  i.—iss.). It is given whole, on a fasting stomach, at bedtime or just before eating. The dose varies with each person, but should be sufficient to procure one or two easy evacuations daily.

This kind of purgation causes no colic, and is of especial use to those who are habitually constipated, and whose digestion is laborious. We have found it especially useful to those suffering with piles. The physician must decide whether this digestive torpor depends on inflammation, in which case the use of white mustard-seed would not be indicated.

Popular opinion ascribes its chief virtue to its depurative function. The question must be examined, first by experiment, next by theory. All the evidence shows (and our own experience does not permit us to



doubt it) that this substance has a very powerful depurative action; cutaneous diseases and chronic rheumatisms, which nothing could benefit, have been cured or placed in a way to be cured by the long-continued use of white mustard-seed. This fact is to be explained as follows:

Must not the permanent irritation of the surface of the digestive mucous membrane, producing as it does a continual secretion of mucus, be considered as a derivative act, and may we not explain the disappearance or diminution of a disease by this derivation alone? This view seems to us the more reasonable, as frequent purgation has been regarded by all physicians as an efficient treatment of chronic diseases of the skin. And again: if we remember that mustard-seed only keeps the bowels a little relaxed without causing active irritation of the mucous membrane, and that drastic purgatives, though they stimulate that surface much more actively, do not cure darts and rheumatisms so surely, we shall be forced to infer that there is in mustard, as in most other cruciferæ, an active principle which probably modifies the blood and consequently the whole system. Perhaps this active principle is only sulphur, which is known to exist in a considerable proportion in all the plants of this family.

Whatever be the explanation (we do not attach much importance to our hypothesis), we appeal to the facts alone, and call attention to a remedy which, because too well known, is too little appreciated.

From the seed of *sinapis alba* are made most of the mustards eaten at table. This article, well appreciated by old men and by persons whose digestion is sluggish, is unjustly condemned by certain physicians. It is certainly not appropriate to those who digest laboriously, as they have an acute or subacute gastritis; but in certain chronic forms of gastritis, in a great many gastralgiæ, and in general, in those affections of the digestive tube in which the muscular layer is evidently inert, and the normal secretions of the mucous membrane are almost entirely suppressed, mustard, taken from time to time, is of use, and becomes almost a necessary condition of good digestion.

*Black mustard* (*sinapis nigra*) is most commonly used externally. It is ground, and used in sinapisms, cataplasms, mustard-baths, etc. It is one of the most common remedies; and yet its mode of action is not generally well known.

In almost all the books on materia medica, in the majority of articles in dictionaries, we are struck with the discrepancies between authors. Some recommend mixing with warm water or warm vinegar indifferently; others prefer vinegar or concentrated acetic acid, to produce a more active effect. Some expressly direct the choice of freshly ground meal; others direct only the use of the bran. As regards the period of application, some have it four hours in contact with the skin, some two or three hours, others an hour or an hour and a half.

What are the readers of books to do?—Not knowing how to decide, we did what we might have done at the beginning; before writing we

made experiments, and we shall now give their results. They were made in 1829 and published in 1830, and confirm the chemical results of M. Fauré and the more recent ones of M. Boutron.

1st question :—Should the mustard be freshly ground, or long ground ?

We mixed two portions of mustard in cold water. One had been ground a week, and kept in a closed box; the other, five months, and kept in a paper bag in a damp chest of drawers. The two were applied to the right and left thigh respectively.

*Fresh Mustard.*

After 4½ min., slight prickling,  
5 min., a little heat, slight throbbing synchronous with pulse.  
6 min., lively smarting.  
7 min., smarting increases.  
8 min., smarting very intense.  
9 min., the pain becomes deeper; sensation of weight in the part in contact with mustard.  
10 min., sensation of heat and burning; very hot.

*Old Mustard.*

4½ min., no sensation.  
5 min., no sensation.  
6 min., slight prickling.  
7 min., slight smarting.  
8 min., smarting lively, arterial pulsation.  
9 min., sensation of burning; pain becomes deeper.  
10 min., sensation the same as in the other leg.

The experiment always gave the same result. Old flour acted at the end of ten minutes exactly in the same way as new, though it began to act much more slowly. There is, then, no remarkable difference between black mustard ground a week and that which has been ground five months.

2d Question.—Does a sinapism prepared with hot water act more quickly than one prepared with cold water ?

We applied two sinapisms, one prepared with water at 40° (104° F.), and the other with water at 15° (59° F.).

*Cold water.*—See the first experiment.

*Warm water.*—Two minutes, slight sensation; 3, a little smarting; 4, acute smarting, slight arterial throbbing; 5, painful smarting, throbbing very perceptible, pain more profound; 5½, pain very acute and violent; 7, pain no longer sensibly increasing; afterwards it becomes more profound; the arterial throbbing is less energetic; 10 minutes, same condition.

We see that the one which was prepared with warm water acts much more quickly than the cold one. But, after all, at the end of ten minutes the effects are exactly alike. This is easily understood, since the time is sufficient to enable the temperature of the skin and the sinapism to become equal.

We do not conclude that it is indifferent whether we apply it warm or cold: the sensation of a cold body applied to the skin must certainly in certain cases be injurious. But the temperature of the application is so speedily equalized with that of the skin, and the blood comes so quickly



to the derma, that we regard the fears entertained by some therapeutists as greatly exaggerated. But it is important to add that if the sinapism had been prepared with boiling water instead of water at 40°, it would certainly have lost its irritating power.

3d Question.—Does mustard flour mixed with vinegar act with more power than that mixed with water?

*Water*.—See first experiment.

*Vinegar*.—Fifteen minutes, slight smarting; twenty, smarting a little increased, but hardly appreciable; twenty-five, it becomes a little more active; fifty, a little more decided, nearly equivalent to that which the sinapism made with water causes at the end of six minutes.

This experiment was made several times upon different persons, and gave constant results. Comparing the time required to produce a certain result, we might say that the degree of activity of the one is to that of the other as 6 to 50, or 1 to 8.

In these experiments the vinegar was cold. Wishing now to ascertain whether warm vinegar acted more energetically, we made the experiment, but found an entirely negative answer.

Wishing to see whether the dilution of the fluid (table vinegar) used in these experiments might have affected the results, we now mixed the mustard flour with equal parts of water and concentrated acetic acid, and obtained the following result:

We left the sinapism 45 minutes in contact with the skin, without producing the least sensation of stinging.

Finally, we prepared two sinapisms, one with concentrated acetic acid, and the other with water. The results are so extraordinary that we place them side by side.

#### *Water.*

6 min., slight prickling.  
7 min., active stinging.  
8 min., active stinging and arterial pulsations.  
9 min., sensation of burning.  
10 min., very painful; removed.

#### *Concentrated Acetic Acid.*

6 min., nothing.  
7 min., moderate stinging.  
8 min., stinging a little increased.  
9 min., pain less than in the other sinapism.  
10 min., stinging rather sharp; light arterial pulsations.  
11 min., stinging painful; sensation different from that produced by the other.  
12 min., sensation of burning; removed.

One would hardly have supposed a priori that concentrated acetic acid would act with less energy than water in a sinapism.

Having seen that concentrated acetic acid had almost no activity when mixed with mustard, we were curious to know if a cataplasm made of sawdust with the same acid would be more active than the sinapism; in consequence, we made a paste of the acid and the dust of our writing-

desk, and applied it upon our own leg. In a minute and a half acute stinging was felt; in two minutes the pain was severe; half a minute later it was insupportable, and in three minutes it was so violent that we were forced to remove the application; but the skin was severely cauterized.

Mustard, therefore, when mixed with water, acts more energetically than when mixed with common vinegar, weak or strong acetic acid; and acetic mixed with mustard loses some of its efficacy. The mustard is weakened by the acid, and the acid by the mustard.

If we wish to produce active rubefaction and even a superficial burn of the skin, it is sufficient to place acetic acid for three minutes in contact with the skin, in a sponge or some inert powder; and certainly, no sinapism will act so speedily. But if we want a sinapization, that is, a modification of the skin which produces a *sinapic* sensation, redness and swelling (the expression is exact), we require mustard and water. And when we wish to mitigate a sinapism, instead of adding flaxseed, bread-crumbs, or yeast, it is sufficient to prepare it with vinegar.

All the vinegar-makers in the world teach their apprentices the art of correcting the sting of mustard with vinegar; the useful lesson has not been lost on everybody. Aetius insisted on the point when he said: "Sed et hoc noscendum est: si in aceto maceretur sinapi, inefficacius redditur; acetum enim sinapio vim discutit" ("Aetii de atrabili, sermo tertius. Sinapismi præparatio"). Schwilgué repeated it in his "Traité de matière médicale," and it was long customary in our hospitals to weaken sinapisms with vinegar. But it is only a little while ago that the contrary was taught in all the courses and the books; which is our reason for publishing these experiments, which have already resulted in making our physicians acquainted with a notion which we owe to Aetius.

Before concluding what we have to say of sinapisms made with water and vinegar, we must say that our own experiments were made with excellent black mustard flour, ground as it is by all the good druggists in Paris; the quality of the flour need not be questioned, as it causes almost insupportable pain in ten minutes.

We procured also some "English flour," which is sold for preparing the fresh mustard of our tables. We mixed this with water, and prepared another sinapism with ordinary black mustard, but the action was identical in the two cases; then mixing with vinegar, we were no little astonished to find the results different from the former ones, for the addition of vinegar did not so completely destroy their activity.

We are entirely ignorant of the cause of this difference. But M. Guibourt has shown that the English flour was not prepared with white mustard seed, but with the black, and the difference between the English and the French flour consisted in the fact that the latter had been passed through a sieve with wider meshes. The only physical difference between the two is, that the French kind is of a dirty yellow specked with brown, while the other, very finely ground, seems free from bran, and is of a uniform jonquil color.



We prepared some sinapisms with alcohol, but they were less powerful than those prepared with mustard.

We will now add some remarks on the direct effects of sinapisms, and will conclude by considerations on the means for soothing the severe pains which the application sometimes causes.

We saw that if the sinapism was prepared with good flour and water, a sensation of prickling occurred at the point of contact within four or five minutes; this became more and more severe, and in ten minutes resembled the pain caused by white-hot iron held a little way from the skin. Almost intolerable in ten minutes, it grows more and more deep, and is soon constrictive and gravative, that is, it gives the feeling of a heavy body weighing on the muscles and compressing them. This sensation is less intolerable than that which preceded it, so that a sinapism can be borne much longer than would have been supposed from the severity of the first pains. But when the calm, or rather the change in the character of the pains has lasted twenty or twenty-five minutes, the sensation of burning begins afresh, more severe than ever, and the most docile and courageous patients rarely bear three-quarters of an hour of a well-made sinapism unless their sensibility is blunted by an idiopathic or secondary cerebral affection.

When the application is raised, the impression of the cold air almost wholly puts a stop to the pain. The skin is not swollen, and there is hardly any redness; but in a few moments the stinging reappears, the skin is dotted with red points, and soon becomes of a uniform rose color. The stinging becomes more acute and is at last a burning; the least rubbing exasperates it, and the impression of cold lessens it. However lively the redness, there is no very distinct swelling, unless the person is predisposed to œdema. The stinging may last twelve hours, and even a week; it has a special character, and produces, especially in women, a nervous excitability which is not always without danger. We have seen women suffering cruel and unconquerable insomnia, shedding tears, and attacked with quite severe nervous symptoms, so acute were the sufferings.

The redness lasts much longer than the pain, and often exists in a high degree when the stinging has almost entirely disappeared, at the end of eight or ten days; but in this case an itching appears every evening, which is by no means painful, but rather pleasant to scratch.

When the sinapisms have been long applied and often repeated, though they may not have caused blisters, they may leave yellow spots, which are sometimes indelible.

A sinapism must be applied a long time to produce vesication; and the ampullæ appear much later than when cantharides are used. The phlyctenæ do not rise all at one time, so as to form one large bulla, but are developed partially and successively.

Such are the effects of a sinapism prepared with water, on the skin of most persons, when applied not longer than fourteen or fifteen minutes. Some persons are less irritable, and resist the action of mustard; but our

experience shows that it is usually injurious to let it remain an hour; we consider the direction sometimes given, to leave it three or four hours in contact with the skin, as very dangerous.

We know a lady who, at the age of twenty, had convulsions during childbirth, in consequence of which she fell into a profound coma; the physician bled her, and applied at the same time four sinapisms, two on the wrists and two on the ankles. The mustard remained on but three hours, and though the patient gave no sign of sensibility during that period, yet eschars were afterwards formed, and she nearly fell a victim to the excessive activity of treatment.

In circumstances like this it is important to know how long a sinapism may be applied, since when consciousness is suspended the remedy may exhaust all its activity on the skin before the brain is informed; and when consciousness returns, we are surprised to hear the patient complain of frightful pain, a symptom of profound lesion of the skin.

The same caution is applicable to those febrile affections in which the nervous centres are deeply involved. Thus, in dothineritis or scarlatina, complicated with ataxo-dynamic symptoms, etc., sinapisms are sometimes left on for ten or twelve hours, the patient meanwhile showing no sensibility, though the skin is red and phlyctenæ are formed. Two or three days later, when the sensibility returns, the pain becomes insupportable, and a new fever is kindled; the skin becomes gangrenous, and in some cases the remedy is accused of causing death.

We conclude that a sinapism prepared with water ought never to be left applied more than one hour; that, even when no complaint is made, it must be removed at that time; and that, if we desire the effect to be produced slowly, and the mustard to remain applied for several hours, we must mix with vinegar in order to moderate the activity, or change the position every quarter of an hour.

Two things have prevented physicians from understanding the degree of activity which sinapisms possess: first, the belief that they are never so active as when made with vinegar, and second, the adulteration of the remedy.

Many pharmacists, even in Paris, have no mill to grind mustard, and buy it already ground, of the wholesale dealers. The latter sophisticate it in every way; they add the refuse of colza or flax-seed, and a coloring matter. The only reliance is to be placed on mustard ground in the drug-shops. The family and even the physician do not hesitate to send to the next grocer; and we have seen a poultice made from mustard thus bought, which remained applied eight hours without causing the least stinging, while the same person felt insupportable pain in ten minutes, when a similar poultice of mustard ground by the druggist was applied.

Since this experience, we have several times encountered accidents caused by sinapisms which were not kept on over an hour. We first tried laudanum and the opiates, applied to the inflamed skin, but this hardly lessened the pain, though the dose was carried to the point of



producing intoxication. A much more successful application was found to be:

Unguent. populeum, . . . . .	15 grammes ( $\frac{7}{3}$ ss.).
Extr. belladonnæ, )	
“ hyoscyami, {	.....āā 0·3 “ (gr. ivss.).
“ stramonii, }	

A thin layer of this is to be spread on a cloth and applied to the affected part. A cataplasm composed as follows is equally useful:

Belladonna, leaves and stalks, )	
Hyoscyamus, “ “ {	.....āā 8 grammes ( 3 ii.).
Stramonium, “ “ }	

Boil in 1,000 grammes (1 quart) of water till reduced to one-half; make poultices with bread-crumbs or flax-seed meal mixed with the decoction.

The “baume tranquille” may also be used to anoint with; but alcoholic liquors, such as laudanum, cause extremely severe pains.

If the skin is severely excoriated, these narcotics may cause vertigo and somnolence; the dose must then be lessened, in proportion to the extent of the denuded surface.

As for the special conditions which demand the use of sinapisms, we shall speak of them in the chapter on Irritant Treatment, where their effects will be studied by comparison with those of other agents.

## CANTHARIDES.

### *Physiological Action.*

Various insects of the class cantharis contain cantharidin, which is really the only vesicating principle that they do contain. But as the officinal cantharis is the only one generally employed, we will take it as the type.

Cantharides in powder, and the numerous preparations which retain the active principle, are very dangerous poisons. Cases of poisoning are frequently produced by this substance, whether given to excite the venereal orgasm, or to provoke abortion. The ingestion of cantharides, in addition to the gastric symptoms which are common to all acrid poisons, produces special nervous symptoms, as somnolence, delirium, slowness of circulation, and an excitement of the genital organs which is sometimes excessive.

Placed in contact with the skin, the powder of cantharides produces in a few hours a feeling of numbness which is at first hardly painful, but afterwards becomes a sense of painful pressure, and then of burning. The suffering is rarely acute, except the patient makes a good deal of

movement and irritates the denuded papillæ. After a time, the length of which depends on a great many circumstances, the epidermis is raised by small bullæ filled with serum, though the skin is not very red. Afterwards, if the action is continued, the bullæ unite and form a single phlyctena. When removed, it discovers a layer of half-coagulated lymph on the surface of the skin, easily separated, and usually repeated after each dressing, so as sometimes to form a very plastic and thick layer.

These false membranes are easily raised at the first dressings, but afterwards they become more and more adherent, and at last form a sort of artificial epidermis which dries, and under which, after a few days, is found a delicate red epidermis like that of a fresh cicatrix. In other cases, when the action has not been energetic, no appreciable false membranes are formed, but the epidermis is reformed directly from a layer of the liquor exhaled from the skin, which seems to dry at contact with the air.

Besides this topical action, there is a general one, due on the one hand to the inflammation of the skin, however slight its intensity may be; on the other, to the resorption of an irritant element which circulates in the blood and stimulates the different tissues of the system. This fact of absorption is well known by symptoms referred to the kidneys, bladder, and generative organs; perhaps, also these accidents form a partial cause of the general reaction of which we lately spoke.

On the part of the urino-genital system, the symptoms are commonly slight, unless the blister be extremely large, or cantharides have been swallowed. They usually consist of an increase in the quantity of urine, and in the frequency with which it is passed—a frequency out of proportion to the amount passed;—in men, there is heat in urinating, with a tendency to erection; in women, a much more marked burning, and rarely erotic erethism. These slight disorders are not spoken of by the patient unless his attention is called to them; but when the person is irritable, or has taken a great quantity of the drug, or the blister has been too large, or applied to a recently scarified surface, the symptoms have a form and intensity which cannot be concealed. Thus, there is suppression or retention of urine, with a spasm of the urethra which the sound cannot always overcome; acute cystitis or nephritis; painful priapism, which may become inflammation, and even gangrene of the penis; insatiable nymphomania, acute metritis, etc.; but most frequently, symptoms lying between those just described and those named before. Bouillaud and Morel-Lavallée, have lately proved that an albuminous secretion mingles with the urine, under the influence of a large blister, which may easily be proved by nitric acid. Fibrine, also, is secreted, and is sometimes condensed as a false membrane in the bladder, and sometimes is found at the bottom of the urinal.

We shall consider cantharides chiefly as an agent for producing vesication; and shall give from our own experience some directions for dressing the blister and relieving the symptoms which sometimes appear.



If we desire only a flying-blister, the application must last only long enough to raise the skin, a time which varies according to the preparation used, the nature of the patient's skin, the disease—in short, a multitude of circumstances, which must always be taken into account.

As soon as the blister is formed, the vesicant is removed, and at the lowest point an opening is made with scissors, so as to let the serum escape. The epidermis will then be exactly in contact with the chorion, so that the pain will be less at first, and the healing much quicker. The part is then covered with a compress or piece of wadding spread with cerate and held by a proper bandage; this dressing is renewed twice a day, till the exudation of serum is at an end.

We have seen the following dressing used with success:

Starch.....	35 grammes ( 3 ix.).
Water.....	35 “
Glycerine.....	220 “ ( 3 lv.).

Mix the water and the starch, add the glycerine, and stir over a fire to the consistency of a cerate.

When the blister is to serve as an exutory, we leave the vesicant on the skin several hours after the blister is formed. The skin is to be entirely removed, and the derma sponged to get rid of the superficial layer of fibrin. The irritation of the skin is such as to require to be lessened rather than increased; the first dressings should not be made with cerate, but with butter, or any fatty body which does not cause too rapid cicatrization. Where a tendency to healing is seen, the butter is replaced by an epispastic ointment or fabric, of cantharides or mezereon, and so on until a new indication arises, observing the following rules. We will suppose the following cases:

- The blister dries up or suppurates too freely;
- It is covered with false membranes;
- It is surrounded with a dartsous eruption;
- It is covered with vegetations;
- It causes dysury.

A. *The blister dries, or suppurates too freely.*—In certain persons the blisters cannot suppurate, and dry very rapidly, though dressed with ointment active enough to produce in other cases the greatest abundance of suppuration. Some of the causes of this circumstance may be understood, but usually it is impossible to do so, and only the effects are seen. Some persons' wounds heal with great ease, and, as it were, by first intention, and suppuration is established with the greatest difficulty. Others have what the vulgar call humors, and in them the least scratch becomes poisoned, and suppuration seems endless. In the former class, blisters are very hard to keep open; in the latter, but little care is needed to maintain suppuration a long time. In old men, suppuration is very hard to establish in blisters, which is explained by the want of vascularity of

the skin in advanced life; but it is a stranger thing, and one which we could not believe till we had repeatedly seen it, that the suppuration is perhaps even more difficult to maintain in young people than in the old; and if we explained the former case by the deficient vascularity of the skin, we must explain the latter by the excess of plastic force in youth, by virtue of which cicatrization takes place very rapidly.

In any case, experience shows that blisters, *cæteris paribus*, should be kept open in old men and children with much more powerful applications than those which are suitable for adults. The activity of the epispastic agent should be proportioned to the difficulty experienced in maintaining suppuration.

B. *The blister is covered with false membranes.*—The generally received opinion is, that the excess of cantharidal inflammation is the cause of this supersecretion of false membrane which is observed so often on blisters. It is certain that the action of cantharides produces a pseudo-membranous phlegmasia, as shown by Bretonneau. This physician, by injecting cantharidal ether into the trachea or larynx of dogs, caused a membranous inflammation very like that of diphtheria; a little of the same ether, when applied to the mucous membrane of a dog's lip, caused a detachment of the epithelium in fifteen or twenty minutes, and a false membrane was soon formed underneath, which was easily raised, and for a day or two was quickly renewed.

We have said enough to show that the cantharidal inflammation is essentially membranous; but does it follow that the excess of this inflammation is the cause of the accumulation of successive layers of fibrine? We do not think so. In fact, if the strength of the ointment, stuff, or paper be diminished, we find the false membranes becoming more and more adherent, and the blister drying up. The application of cataplasms, though sometimes recommended with the same object, sometimes softens the false membranes, so that they can be easily raised with a spatula, but at other times it is quite insufficient.

The treatment which succeeds best is directly opposite to this. When the sore persists in forming fresh membranes, which become more and more adherent, we apply a new blister to the spot, or a little ethereal extract of cantharides, and next day we see the false membrane raised as if it were epidermis, and underneath it the derma, perfectly clean. For some days there is no tendency to form fibrinous concretions, but the sore retains an improved aspect, showing that if the cantharidal inflammation was the cause of the production of fibrinous layers, an excess of inflammation seems not to have the same effect; at least, this excess gives rise to membranes which are less dry, less adherent, though more numerous.

When, therefore, the sore of a blister is covered with an adherent false membrane, it is necessary to use more energetic epispastic ointments, plasters and paper.

One exception, however, must be noted here. It sometimes happens that the exposed surface becomes all at once very painful, and covered



with soft, grayish, pultaceous concretions which have a very bad smell. When we try to remove them the blood flows; and the skin which surrounds them has an erysipelatous tint. A more active ointment would only aggravate this condition, which is better suited by emollient cataplasms at first and powdered calomel afterwards, or a cerate made of 1 part of white precipitate to 38 of Galen's cerate; this dressing promptly improves the condition of the sore, and should be continued until the inflammation is gone and laudable suppuration is re-established.

C. *The blister is surrounded by a dartrous eruption.*—It very often happens, to persons subject to dartrous affections, that the skin about the blister is covered with vesicles, at first separate, but afterwards confluent, and forming a genuine eczema; pustules of impetigo may even appear, and an intolerable itching and an acute pain follow. The eczema, at first limited to the arm where the blister was applied, often extends by degrees, in an acute form, to the entire surface of the body. Fever is then kindled, and general symptoms of some gravity may appear.

But in non-dartrous persons, though this extension of inflammation is quite rare, it is, nevertheless, sometimes seen, especially near the blister. The remedies which we have found most useful, while the eczema remains confined to the neighborhood, are at first dressing with a linen cloth soaked in glycerine; and soon after, when the local phlegmasia is lessened, a pomade made of red precipitate 1 gramme, cerate 15 or 25 grammes; applications of a liniment of equal parts of lime-water and sweet almond oil or linseed oil, morning and evening; ointments of carbonate or acetate of lead; washes with Goulard's vegeto-mineral water, etc., the surface of the blister being less energetically stimulated at the same time.

When the eczema is generalized and is accompanied by febrile reaction, a bleeding from the arm, general emollient baths, diet, laxatives, and afterwards full baths containing 10 or 15 grammes (3 iijs.—iv.) of bichloride of mercury, will speedily bring relief.

D. *The blister becomes covered with vegetations.*—When the blister has been long and severely inflamed, it is often covered with vegetations like old sores. In this case superficial cauterization with nitrate of silver, or acid nitrate of mercury, the application of powdered burnt alum, sulphate of copper, etc., usually relieve this condition. The blister should be healed, and, if necessary, another one made elsewhere. In spite of this precaution, the cicatrix will remain uneven, sometimes painful, and cure will often be hard to obtain.

E. *The blister causes dysury.*—This usually appears on the day the blister is applied. It is caused by the absorption of cantharidin from the denuded surface. The only remedy is to make the patient drink freely; this increases the quantity of urine, and no irritation of the urinary passages occurs. In very irritable, and exceptionably susceptible patients, the dressing with cantharidal ointment, etc., often affects the bladder. In this case we must immediately substitute mezereon with cantharides, which of itself puts an end to all the trouble.

If we cannot make this substitution, the internal use of camphor, in the dose of 15—30 centigrammes (gr.  $2\frac{1}{4}$ — $4\frac{1}{2}$ ) is advisable. If this is not borne, dissolve the camphor in the fatty substances which are used for dressing, and you will very probably avoid the vesical and renal difficulties.

We must add that preparations of mezereon produce very acute pain, followed by bloody irritations.

### THERAPEUTIC ACTION.

In spite of the activity of this remedy (and perhaps because of it), some therapeutists have ventured to prescribe it for internal use, and have been followed by a great number of modern practitioners of good reputation.

The father of medicine, Hippocrates, gave the powder of cantharides in dropsy, apoplexy and jaundice; he recommended it in difficult labors, to solicit the expulsion of the fœtus and placenta. He believed that he had proved its emmenagogue virtues.

*Impotence.*—The elective affinity of cantharides for the genito-urinary organs was recognized in the first age of medicine. We are informed by historians that they formed part of philters or love-potions. Experience has shown that the internal use of cantharides places these organs in a condition of erethism which is not free from danger, and may at any time cause bloody piss and inflammation of the womb or penis, and even sphacelus of the latter. We advise physicians, if ever inclined to use cantharides for this purpose, to be extremely careful, and to restrain those patients who wish to recall a long-regretted but unseasonable pleasure.

*Dysury.*—In spite of the imposing authority of Hippocrates, the internal use of cantharides for diseases other than impotence had almost ceased, when J. Groenevelt, an English physician, attempted to reinstate it; becoming, however, the object of very active persecution from his brethren. He gave it chiefly in dysury. With 60 centigrammes (gr. 9) of powdered cantharides and 75 (12 gr.) of camphor, he made two or three boluses, which were to be taken at intervals of four hours (J. Groenevelt: "Tutus cantharidum usus internus," Londini, 1698). Werlhoff ("Commercium litterarium," year 1733) recommends this in dysuria; he gave cantharides without camphor, 5 centigrammes of powder every 4 hours. In dysury of old men, which is often attributable to a semi-paresis of the bladder, this treatment is plainly rational and cannot usually cause any decidedly bad symptoms; but if due to chronic inflammation of the neck of the bladder, such as may be due to a calculus or the frequent tearing of the mucous membrane by gravel, or if due to a serious swelling of the prostate, it is questionable if cantharides will render the same services; these and other considerations have thrown discredit, and still do, upon the internal administration of cantharides.



A little later than Groenevelt, Th. Bartolin gave a vinous infusion of cantharides in blennorrhagia ("Cantharidum usus internus," in "Hist. anatom. cent.," V., hist. 82). This singular remedy, adopted by Werlhoff, was again used and highly praised by Richard Mead ("Monita et præcepta," Londini, 1754), who digested 8 grammes of powdered cantharides in 750 grammes of alcohol (3 ii.—3 xxiv.), of which tincture he gave from 30 to 59 drops morning and evening; and in our times we have seen Robertson, of Edinburgh, treat blennorrhagia with the enormous dose of 15 grammes (3 iv.) of tincture of cantharides in 24 hours ("Biblioth. médicale," t. XX., p. 39).

Our view of the action of copaiba in blennorrhagia is that it causes in the mucous membrane an artificial irritation which replaces the morbid irritation. We account in the same way for the action of cantharides in blennorrhagia and the other irritant diseases of the urinary passages; but evidently there is danger here, unless the physician rightly proportions the artificial local inflammation to that already present. We shall give rules for the application under Substitutive Treatment.

*Vesical catarrh.*—We will here recall what we said above, in speaking of the physiological action of the remedy, and explain how we are justified in comparing the internal use of cantharides up to a certain point with irritant injections into the bladder, or urethra, to relieve inflammation of their mucous membranes.

The writings of Morel-Lavallée, and Bouillaud, and the inaugural thesis of M. Dourif (5 mai, 1849), leave little to be desired under this head.

Bouillaud finds evident traces of inflammation of the kidneys and the ureter after applying large blisters. He has once found small false membranes on the mucous surface of the pelves, and a portion of false membrane at the vesical orifices of the ureters, showing the irritating action of cantharides upon the kidney and ureter. He also found the urine albuminous under the same circumstances.

Morel-Lavallée has proved by autopsies (Andral and Vidal of Cassis state the same) that the bladder and the urethral canal are inflamed by the same cause. He has sometimes seen the vesical mucous membrane covered with a real fibrinous false membrane, and has found such membranes in the chamber-pot.

We shall not speak of the use of cantharides in epilepsy, hydrophobia, hysteria, etc.; the heroic and dangerous nature of a remedy attracts some physicians to use it in treating acute and chronic affections which are thought incurable; and, as it is hard to admit a failure, the value of a remedy is often exaggerated, until the physician comes to deceive himself and others.

*Eczema.*—Cantharides were anciently used for chronic diseases of the skin, as in the case of that Roman knight mentioned by Pliny, who was killed by drinking a potion which contained cantharides, given to cure an obstinate eruption. We must come down nearly to our own time to

find it used by physicians. Lorry ("Tractatus de morb. cutan.," Paris, 1777, p. 388) recommends tincture of cantharides in elephantiasis græcorum, and states positively that in his time it was much used by English physicians for skin diseases.

Biett, who is reported by Cazenave ("Dict. de méd.," 2e édit., t. VI., p. 349) to have used alcoholic tincture of cantharides at the hospital of Saint Louis for more than twenty years, in a great number of diseases, obtained very good results, chiefly in certain chronic eczemas and dermatoses of the squamous form. The tincture, in the dose of 3 drops at first, and gradually increased to 20 or more, is very successful in psoriasis, and still more so in lepra vulgaris. If given with prudence and closely watched, it causes no accidents; under its influence the skin resumes vigor, the papular elevations disappear, and in a month or six weeks, and often earlier, we may obtain the complete cure of a disease which had lasted for months. It is worthy of remark that the remedy acts more speedily and effectually in women, and in young, sanguine and active persons, than in the weak. We even admit that cantharides may have a very special action upon certain forms of this disease.

The ointment of Dupuytren is intended for baldness. It is plain that in some cases the loss of hair is caused by an herpetic affection of the scalp, and for this reason a substitutive irritation with an ointment may arrest this cause by curing the affection of the skin. But when the baldness is hereditary, or due to age, or is accompanied (as usually is the case), by atrophy of the bulbs, it is too plain that no ointment can restore to the skin of the scalp its normal anatomical structure.

The physicians of India use not only cantharides, but several sorts of mylabris, as the *m. cichoris*, *puncta*, *pustulata*, and *indica*. The natives of the marshes of Pondicherry use the root of *plumbago zeylanica* in powder, which is said to have the advantage of not acting on the urinary organs, while *ammania vesicatoria* is only a vesicant of inferior power to the preceding (*Gaz. hebdomadaire*, août, 1861).

### INJURIOUS EFFECTS OF BLISTERS.

The revulsive action of blisters is one of the most precious acquisitions of therapeutics, but it must not be forgotten that it is attended with dangers. The irritation of the skin may go beyond vesication; we have spoken of diphtheria of the sore; in persons of enfeebled constitution, ulceration, anthrax, furuncles, even gangrene of the exposed surface may occur; or it may become the starting-point of erysipelas. We have mentioned the irritation of the genito-urinal passages; they may become extremely intense; and the albuminuria, which is usually transient, may be prolonged and degenerate into Bright's disease (Cornil: "Des différentes espèces de néphrites," 1869).

The indications for blisters are given under "Irritant Treatment."



## MEZEREON.

The different species of this plant were once used as stimulants and diaphoretics, especially in diseases of the bony system, in osteocopic pains, exostoses, scrofula, dartsous affections, and chronic rheumatism. A great many authors, including Russel, Home, Swediaur, Wright, recommend the bark as of great value, especially in constitutional syphilis. It is no doubt upon the authority of these that Cazenave desired to re-introduce it in the treatment of syphilis.

It requires to be used with care, as it is capable of causing rather severe effects. We have seen a patient affected with local paralysis, which was supposed to be due to an intracranial syphilitic exostosis, who, after taking a decoction of mezereon, suffered from severe trouble of the bladder, on two distinct occasions; so that the man's regular attendant, who at first had refused to believe that the remedy acted thus, was obliged to submit to the evidence and abandon the remedy. Is this fact exceptional, or does mezereon exert in a very slight degree an irritant action upon the urinary passages analogous to that of cantharides? This question we cannot decide.

The decoction, given internally, is made with from 1 to 8 grammes (gr. 15—3 ii.) to the quart of water.

The bark is used as an epispastic; but it acts slowly, and this way of applying blisters can only be used where the skin is extremely fine, as behind the ears; or in the case of patients who are irritated by cantharides.

To produce vesication or rubefaction with the bark, we choose a flexible and single piece, which is to be macerated in water, or better, in vinegar; this is placed on the skin so as to be in very close contact. In twenty-four or thirty-six hours, very small vesicles are seen rising, and by continuing the application and frequently renewing it we form a superficial ulceration which may be long maintained by the same means.

Leclerc of Tours has prepared aqueous, alcoholic and ethereal extracts of mezereon bark. An epithem made with each was applied to the forearms of three patients. The ethereal extract alone produced an energetic action. A large number of small vesicles full of a turbid serum were formed on the spot covered by this epithem. A simple rubefaction was obtained by the alcoholic extract, while the watery extract produced no effect (Leclerc: "Essai sur les épispastiques," *Journal des connaissances médico-chirurgicales*, t. III., p. 92).

It hence appears that if we desire to make an ointment of mezereon, for the purpose of exciting suppuration in blisters, we should always use the ethereal extract, which should also be preferred to the bark, when we wish to excite a little inflammation on a portion of delicate skin.

Mezereon is the basis of most epispastic papers for keeping open blisters.

## NETTLE.

The *urtica urens* is ordinarily used in external medicine.

*Urtication*.—This term signifies the irritant effect produced upon the skin by contact with nettles. To produce it, make a little bunch of the longest stems of the *u. urens*, and strike several times lightly on the part of the skin you wish to irritate. The skin is almost immediately covered with large, flat, white, irregular papules, which cause an insupportable burning pain. This genuine “urticaria” disappears with the same rapidity, and the operation must be repeated in order to recall it; but the skin does not respond so readily to subsequent appeals, and the third or fourth application may have no marked effect. For this reason, country-women gather nettles with perfect impunity.

Urtication has been recommended for the purpose of recalling exanthemata, and, in general, all external fluxions that develop slowly or tend to disappear, and likewise in all other cases where it is important to set up an energetic fluxion to the skin.

Thus Celsus and Aretæus advise urtication in coma and paralysis (“*De re medica*,” lib. 3, cap. 27.—“*Curat. acut.*,” lib. 1, cap. 2). Others have used it upon the thighs to recall the menses (*Bull. de Ferrussac*, t. IX., p. 77). It has also been recommended in anaphrodisia.

In the epidemics of cholera which have passed through our country, a certain number of physicians, especially in the country, have used urtication in the cold stage. When the skin retains sensibility, and the alidity is not complete, some good effects have been produced; but it has been praised ridiculously, and, on the whole, it is neither better nor worse than most other irritants of the skin.

## RANUNCULACEÆ.

Many members of this family of plants have a very powerful action on the skin. The species which compose the genera *clematis*, *anemone*, *ranunculus* (Linnæus), are the most active. We particularly mention *ranunculus sceleratus*. It has been recommended as a cataplasin, to produce resolution of swollen glands and cold abscesses.

The *clematis vitalba* (beggars’ plant) owes its popular name to the use which beggars make of it to produce upon their limbs appearances which excite the pity of the public. This action, says Leclerc (“*Essai sur les épispastiques*,” *Journal des connaissances médico-chirurgicales*, t. III., p. 91), is analogous to that of mustard; it is profound, yet it quite rarely raises the skin. The inflammation it causes extends to the whole depth of the skin, and beyond.

These vegetables owe their irritant properties to an acrid, volatile oil, difficult to obtain by distillation; this principle irritates the pituitary mem-



brane, excites lachrymation, and possesses a great analogy to that of some *liliaceæ* and *cruciferae*, especially horseradish. It is dissipated by drying, so that the dried *ranunculaceæ* have, so to speak, no irritant property, and cattle may eat them without injury.

These plants may be used when mustard cannot be got; they are beaten to a pulp, and act with sufficient force when placed between two cloths.

*Clematis* is often used in Holland as a diuretic in dropsy. A physician of Liège, M. Sauveur, has used an infusion of *clematis*-seed in two cases of albuminuria symptomatic of Bright's disease; he states that an abundant diuresis was established, the quantity of albumen in the urine lessened from day to day, and the dropsy disappeared (*Gaz. méd.-chir. de Liège*, nov., 1864).

### EUPHORBIACEÆ.

A rather intense vesicular inflammation of the skin is produced by some of these plants; among others, by the *croton tiglium* (the oil) and *euphorbia lathyris* (the milky juice). These two oils, when spread on the skin, produce a genuine dermatitis with pustules.

The amount to be applied varies from 10 to 40 drops. One application will produce, after a few hours, all the signs of inflammation, painful sensibility, redness, swelling, heat; and in 24 hours vesicles are developed. The latter are usually discrete, separate, but in many places run together and may form bullæ.

The contents of the vesicles are at first transparent, and may remain so throughout, but usually grow turbid and purulent on the second day. The pustules are at first tense and shining, but soon sink and become wrinkled. Sometimes the pustule breaks and displays a superficial ulceration, limited by a strip of epidermis, and soon covered with a yellowish crust. In a week the eruption is cured, and nothing remains but a spot which has the color of *ephelis*.

This eruption is usually quite painful during the whole period of its development, and sometimes later, if ulcerated.

Certain secondary eruptions should be mentioned. A patient, suffering from the itching which the eruption produces, will often put his hands upon it to scratch, and will afterwards put them on his face or scrotum, and cause in those places a dermatitis which, though it does not usually cause pustules, is quite painful, particularly on the scrotum. The same thing happens to the person who makes the application, if he does not sufficiently cleanse his hands afterwards.

The volatile portion of the oil may spread the dermatitis to neighboring parts; in particular to the face, when it is rubbed on the neck.

*Laryngitis*.—*Bronchitis*.—Croton oil is used as a revulsive, most commonly to combat acute catarrhal affections of the larynx and bronchi. It

is used almost constantly to relieve a laryngitis which has little of the inflammatory element, but is accompanied by aphonia due to paresis of the vocal cords.

It is also used in chronic recurrent bronchitis and in phthisis, to relieve acute attacks of tubercle or caseous pneumonia. The attempt to relieve meningitis or enteritis has proved unsuccessful, and has been abandoned.

*Dropsy in disease of the heart.—Anasarca.*—The description given above of the action of croton oil was intended to apply to the healthy skin. In anasarca, produced by disease of the heart, two different conditions may exist in the skin of the lower limbs. In some cases, while the anasarca is considerable and the skin distended, the skin is thick like that of pachyderms, exempt from the anasarca, as it were. It is œdematous, and keeps the print of the finger, but is as hard as leather. If these patients are rubbed liberally with croton oil, the eruption produced will be insignificant. Red acuminate points, with a hair in the middle, will be seen here and there, forming an artificial acne; there is a little dermatitis, with some pain, but no abundant secretion.

The case is quite otherwise when the skin is smooth and transparent, and so infiltrated that it seems ready to break out at any moment. If in such a case we make an application of croton oil as before, the eruption will be extremely abundant, and a considerable number of vesicles will form, which will soon become confluent and will break almost immediately. The patient is inundated with a very large quantity of liquid, proceeding not from the secretions of the vesicles alone, but from all the openings of the ulcerations produced by the irritant. It is a genuine flux, and changes the patient's condition so rapidly that if the physician has never seen it before, it causes much uneasiness.

The first effect of this active treatment is to produce an enormous spoliation, which seems to exhaust the patient. The appearance of the limbs is not reassuring; they form a vast sore with a grayish base, resembling an immense sphacelus. But on the second day there is a change. The depletion of the circulatory system allows the patient to breathe more deeply, the heart and blood-vessels regain energy, hæmatisis is re-established, the skin becomes more clear, and the color of the face better. The alarming sore retains the appearance of an eschar for some days, but recovers much sooner than one would suppose.

We have many times employed this practice where digitalis, diuretics, and purgatives had ceased to act, and have been enabled to restore persons to life when the progressive asystole threatened a speedy death.

We only recommend that the oil shall be applied chiefly to the legs and knees, avoiding the upper parts of the thighs; for when the application has been made in the latter place, the scrotum ulcerates, leaving very troublesome sores, often very hard to cure, which make all the patient's movements painful.

*Chronic rheumatism.*—Ten years ago a great noise was made about



a secret process which a charalatan from Germany brought to Paris, called Baunscheidtism. It consisted simply of making punctures in the skin by an instrument which thrust out a row of needles; the punctures were covered with an irritant composed of two parts of oil of sweet almonds and one of croton oil. Thus, by inoculation, a sort of eruption was obtained resembling acne, and recalling in its intensity the eruption produced by thapsia.

This process is now performed with a cylinder covered with needle-points (a spur might answer), which is held by an axis, and is rolled over the surface of the skin; the mixture just named is afterwards applied. The treatment has some efficacy, but may advantageously be replaced by friction with essence of turpentine.

PITCH.—TURPENTINE

Of Burgundy pitch and turpentine as local excitants we will speak in a subsequent chapter devoted to that subject. We give here the Poor-man's plaster :

*Tar Paper.*

Poor-man's Plaster (*Charta picata*).

R. Rosin.....	300 grammes.
Purified Tar.....	200 “
Yellow Wax.....	100 “
Melt together and spread thin on paper, like a plaster.	

RESIN OF THAPSIA GARGANICA.

This resin, obtained by the action of boiling alcohol on the bark of the root of the plant (an umbellifera, very common in Algiers), was proposed by MM. Reboulleau and A. Bertherand in 1857. The former made a vesicating plaster of the resin, which was of a fine yellow, shining and very adhesive; it produces on the skin a rubefaction accompanied by a very intense miliary eruption analogous to that caused by the application of croton oil.

*Plaster of Resin of Thapsia.*

R. Yellow wax.....	420 grammes=	$\frac{7}{3}$ xiii. 3 i.
Rosin.....	150 “	= $\frac{7}{3}$ iv. 3 vss.
Burgundy pitch.....	150 “	= $\frac{7}{3}$ iv. 3 vss.
Boiled turpentine.....	150 “	= $\frac{7}{3}$ iv. 3 vss.
Turpentine from the larch....	50 “	= $\frac{7}{3}$ i. 3 iv. gr. l.
Glycerine.....	50 “	= $\frac{7}{3}$ i. 3 iv. gr. l.
White honey.....	50 “	= $\frac{7}{3}$ i. 3 iv. gr. l.
Resin of thapsia.....	75 “	= $\frac{7}{3}$ ii. 3 iii. gr. xv.
Melt together the first five, and strain through linen. Keep them		

liquid over a very gentle fire, and add the glycerine, the honey, and the thapsia resin (it should be of the consistency of honey). When the mixture is very homogeneous, spread on strips of linen as for ordinary plasters.

The eruption produced by thapsia greatly resembles that produced by croton oil or euphorbia lathyris, but differs in the following points:

1. In its uniformity and regularity, all the pustules being alike.
2. In the large number of pustules.
3. In the rapidity with which pus appears in the vesicles.



## IRRITANTS IN GENERAL.

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IRRITANTS are agents which produce an irritation at the points to which they are applied.

The science of irritant treatment includes the physiological effects of these agents, and the relation between these effects and the therapeutic indications they are called on to fulfil.

We shall divide the subject into four sections: substitutive, transpositive, spoliative, and excitative, irritant treatment.

### SUBSTITUTIVE TREATMENT.

The homœopathic doctrine, considered in its general fundamental idea, certainly does not deserve the ridicule which the therapeutic applications made by the homœopaths have occasioned.

When Hahnemann uttered the principle "*similia similibus curantur*," he proved his position by facts taken from the practice of the most enlightened physicians. It is fully proved that the local phlegmasiæ are often cured by the direct application of irritants, which cause an analogous inflammation of a medicinal character, which takes the place of the primitive irritation.

That which was true in regard to local diseases and topical agents was certainly much less so in general diseases and remedies; but Hahnemann, dazzled by the truth of an idea which he had guessed and formulated, soon exaggerated, like all innovators, the importance of his discovery.

His disciples, as always happens, soon outran their master, and carried him away with their exaggerated ideas; German mysticism soon added its contributions, and the system gained many partisans, for there is no idea so absurd that it does not find physicians to maintain it and patients to throw themselves in the way of experiments. Homœopathy has had its run in Paris, as everywhere; there is hardly a physician but has lost some patients by it; but now that the infatuation is past, and it requires no courage to enter on a combat with an enemy disarmed by ridicule and failure, let us try to discover what is of practical value, not in

the dreams of old homœopathy, but in the first idea that broke from the brain of Hahnemann.

When a morbid cause is applied to a man's body, it produces effects which are necessarily related to the nature of the cause and to the state of the economy which receives the impression.

*Nature of the cause.*—According to Brown and Broussais, there exists but one cause of disease, the application of excitants to the body. Every cause acts simply by the greater or less excitation which it produces—excitants as the cause, excitation as the effect; this is about the sum of the pathological doctrine of these great innovators. The difference in the intensity of the cause, and in the mode of reaction of the economy, are the source of the innumerable varieties of morbid forms. The different interpretation which Brown and Broussais drew from the play of reaction caused the prodigious divergence in their therapeutical conclusions. And yet the fundamental idea of their doctrine is identical; Broussais recognized it when he took the synthetic proposition of Brown's doctrine for the text of his own teaching.

As we have said, Brown and Broussais admitted as an axiom an erroneous proposition which nothing as yet proves; and since their whole doctrine rested on this fragile foundation, they succeeded, while reasoning with much vigor and logic, in reaching the most incorrect conclusions.

That life is kept up only by stimulants, is an apparently self-evident truth; but if we reflect a moment we shall see that it is not provable.

It certainly cannot be denied that life is kept up only by modifiers; the truth of this proposition is trivial; but it has exactly the triviality which belongs to axioms, and therein lies its value. The words modifier and modification express facts which are not opinions; the words stimulant and excitation substitute an opinion for facts, and the reasoning is bad.

It is a fatal error in philosophy to attach to words only a slight importance; in leading propositions words are of the highest moment, and their sense ought to be so clear that their use in discourse should never check the comprehension of the reader.

We shall presently see the importance which belongs to the ideas of modification and modifiers, and how much better they represent facts than does excitation, the principle of Brown and Broussais.

In fact, for these two pathologists, everything lies in the quantity of the stimulus, provided that the organic state is alike in all men.

The gravity of a pneumonia, *ceteris paribus*, depends on the quantity of stimulus applied to the pulmonary parenchyma. With this a proportional extent of local lesion and of reaction exactly corresponds. And so in the pleura, pericardium, peritoneum, liver, brain, uterus, etc.

These facts are incontestable; it is their evident truth that leads astray the illustrious men with whom we differ. When it is shown that external and physical agencies, which are plainly the same for all, bring to



pass different results, they invoke the difference in organisms; and in this they are correct.

Herein are included a large part of the diseases which in strictness are embraced within their system.

But they were soon shaken by the pathologists, who devoted themselves to the study of special diseases; Bretonneau, in particular, in calling attention to special lesions of the mucous membrane—e. g., diphtheria and dothineritis—inflicted upon the doctrines of Edinburgh and the Val-de-Grâce a blow the gravity of which Broussais vainly attempted to deny. Bretonneau agrees with us in thinking that differences in diseases are due much more to difference in their causes than to variety of organization.

In our view, it is less the quantity of action of the morbid cause, than the quality of the modifier, that determines the nature of a disease; as it is not the quantity but the quality of a seed that determines the nature of a crop.

Quantity gives for a result only more or less; quality gives species.

There is to-day no pathologist, however obstinately he may cling to a dichotomic doctrine, that does not admit certain local or general diseases, in which are observed certain forms so constant and invariable that one is forced to admit the importance of the quality of the modifier. In their view these diseases are the minority; in ours, they are the more common.

And first, all the contagious diseases, without exception, are special diseases. Of these we may justly say that they are sown from seed, and necessarily retain some of the quality of a generative agent. And contagious diseases are much more frequent than is commonly supposed.

If we exclude the idea of contagion, and class diseases by their local and general symptoms only, we shall at once find the class of special diseases to be so broad as to fill the greater part of nosology.

Taking, by way of example, those modifiers whose effects are the easiest to follow, we see that the chemical agents, when applied to the body, produce each its special action. Thus, the chlorides of gold, arsenic, zinc and antimony; fire; potassa, soda, lime; nitric, sulphuric, muriatic and fluoric acids; the salts of silver, copper, mercury, etc., act upon the skin so differently, that with a little practice one may recognize the agent by its physical or chemical action upon the tissues, and by the local reaction which succeeds its application.

Here, evidently, we cannot argue from the quantity of action, for experience shows that we can never do with nitrate of silver what we can with butter of antimony, whatever be the doses. It matters little that this is due to the different chemical qualities and modes of combining with the tissues, provided there be a difference, and a constant difference.

If now we examine the poisons, we see each acting in its own way, so that the slightest examination almost always enables us to distinguish the nature of the poison. The least skilled specialist can distinguish the



poisonous effects of opium from those of stramonium, veratria and strychnia; those of lead from those of mercury, copper and arsenic: he readily notes the difference in the effects of the poison of the rattlesnake, the viper, the scorpion, the bee, the tarantula, the mad dog, the animal affected with malignant pustule. Each cause has a special effect, characterized by a particular form, reproduced in each case like the specific character of a series of individuals in a species.

What can we add of the poison of small-pox, vaccinia, scarlatina, measles, syphilis, that has not been told at all times and places?

That which we see in men, we see in animals—nay, in plants, whose organization is so inferior; in their pathological disorders the plants bear a powerful testimony to the influence which the nature of a cause has on the form of a disease. The insects which sting the leaves or twigs produce at the point of contact morbid excrescences, which unmistakably recall the agent; the form of gall that follows the prick of a given insect is so constant that the skilled naturalist can always infer the nature of the contained larva from the form, color and volume of the swelling.

These are not idle questions, but will establish the fact of specificity of duration, a great point in substitutive treatment.

In all these instances it would be flagrantly absurd to attribute the effects solely to the quantity, and not to the quality of the cause. Whatever the quantity of variolous virus employed, it is as impossible to provoke with it the symptoms of hydrophobia, as to make with escharotics an eschar that shall behave like malignant pustule.

If it is absurd to deny to the quality of the cause an immense share in the form of the effect, it is almost as absurd to exclude quantity as a causal element. The matter of more or less is a very important portion of a cause, as regards the intensity of effect—but not as regards the intimate nature of the effect.

Hitherto we have descended from cause to effect. The cause, being well known, well appreciated, in the time of its application to the body, if not in its intimate nature, is easily followed in the play of reaction which it causes in the system, and the special form of the secondary phenomena is easily followed. If all causes were as easy to grasp, there would be no difficulty, and specialty would be easily proved in almost all diseases; but in a great many cases the cause is unknown, the effect alone is before us, and we have to ascend from a known effect to an unknown cause.

The specialty of a disease is as well proved by the invariability of its forms, independently of the causes which produce it, as if the effect and the cause were both known.

The causes of most of the functional troubles of the bowels are wholly unknown to us; but the lesions connected with those functional troubles are so invariable in form that we accept their specific nature at once. Between Asiatic cholera, dysentery, and dothi-enteritis, the differences are so marked and the symptoms accompanying them are so positive, that



the least skilled can distinguish them from one another; and the possibility of such distinction implies the idea of specialty, for no distinction is possible unless there exist specific characters, and the establishing of these characters at once proves specificity.

In the three diseases of which we have just spoken, the nature of the affection is certainly not inferred from the phenomenal quantity, that is, the intensity of each symptom, but by the quality, that is, the special form of certain phenomena, independently of their intensity.

We can never turn a dothineritis into Asiatic cholera, nor a dysentery into cholera morbus, whatever be the severity of the diseases. Each will preserve its distinct features and its specific characteristics. It is philosophical to infer constancy of causes from constancy of effects. Nor is it more logical to presume an identical cause for cholera and yellow fever, than it is to ascribe small-pox and scarlet fever to the action of the same virus.

The followers of Brown and Broussais, after a long struggle with the arguments which were ruining their dichotomic doctrine, were at last forced to recognize special diseases; and as if their system were not destroyed by this admission, they made another attempt to reconcile the doctrine of specialty with their own narrow theories.

What does it matter to Brown whether small-pox is a special disease or not? It is nothing to him; he attends solely to the fact that it is sthenic or asthenic, and requires stimulating or debilitating treatment.

As for Broussais, what does he care that cholera differs from dothineritis in its form? It is after all only an irritation of the digestive tube which calls forth different sympathies. Irritation is the common and culminating phenomenon; it is the only serious cause, it rules all, and from it spring all therapeutic indications. This is the position of Broussais; we have not attenuated it; we have left it in its full strength, but it seems to us none the less weak.

Doubtless, most of the modifying agents, applied to the human body, cause a common local reaction which has been by common consent termed inflammation or irritation. The whole question is reduced to this: whether this phenomenon has really the importance which has been assigned to it. No doubt, inflammation is a common character in malignant pustule and furuncle, variola and impetigo, syphilitic chancre and preputial herpes, acute laryngitis and croup, dothineritis and gastric oppression, catarrhal and blennorrhagic ophthalmia, phagedænic dartre and varus sebaceus, as there are characteristics shared in common by dulcamara and datura stramonium, chelidonium and poppy, eglantine and cherry-laurel, since they belong to the same natural families; but what physician, what naturalist, would be so deluded as to attach a merely secondary importance to their specific traits?

Listen to M. Bretonneau: "The obstinacy of a physician," says this excellent practitioner, "who persists in seeing in bronchial catarrh and pellicular angina only two unimportant shades of one affection, is equal

to that of a naturalist who should maintain that a viper is only a variety of adder, and, offering in proof of this view the similarity of the mode of circulation and of the generic marks only, should regard the scales and the plates which cover the head, and the absence or presence of venom-fangs, as unimportant differences. But what can one say of the enemy of distinctions, when, to his prejudiced eye, a viper and a rattlesnake are only exaggerated adders? What ground can one take? We can insist on the difference of the effects of the bites, and, while waiting for truth to shine forth, can make haste, if a poisoned wound has been received, to remove the cause of a great disease by cutting out a little piece of living tissue" (Bretonneau: "*Notes inédites sur les phlegmasies spéciales*").

The physiologism of Brown and Broussais is not so remote from us as might at first be thought; if it has changed its form and is disguised under the name of variation in tension of vessels, of excitation and paralysis of the vaso-motors, it is still the *strictum* and *laxum* of Themison; formerly it was a property common to all our organs, at the beginning of the century it was incarnated in the tissues, and at present it is only considered in the vaso-motors. It is still the theory of Themison, dressed in the fashion of the day.

We intentionally lay weight on the question of the specific nature of diseases, because this question rules in pathology, and we could not make substitutive medicine understood unless we had previously established the great pathological principle, that "a special modification corresponds to the action of each modifier."

At the beginning of the century this law was called *specificity*; it is now named *determinism*.

All the irritants determine an irritation of a severity and a gravity which, considering the lesion as local or as general, are dependent upon their own essential nature; that is, if we leave out constitutional peculiarities. The attentive pathologist may calculate to a certain point the reach of the irritant, and when he cannot grasp the cause, he may nevertheless, by experience and the application of medical statistics, estimate the probable duration or the gravity of a phlegmasia. He sees that some have a necessary and fated course; that they arise, grow and end at a determined time; that others, uncertain in duration, in some cases have an ephemeral duration, in others are irresistibly prolonged to the end of life, and in others appear and disappear without any regularity in their progress.

A truly learned physician, therefore, knows pretty well the probable duration and the natural course of a disease. This, the most important notion for the therapist, without which he cannot philosophically make the least experiment, is most neglected in clinical study. It is the element which is essentially lacking in all homœopathic physicians.

The progress and duration of a phlegmasia being known, if we could place in contact with the inflamed tissue a modifying agent, itself an irritant, which should change the mode of irritation and shorten the dura-



tion of the disease, should we not be rendering a great service to therapeutics by this substitution?

Now, is this a fair statement? Evidently it is. The conjunctiva is inflamed; a collyrium of sublimate, nitrate of silver, calomel, red precipitate, irritating the inflamed part for a moment, cures the inflammation.

The fact being established, let us study its laws.

And first, although substitution can be practised mediately, that is, through the absorbents, upon tissues with which the irritants are not in direct contact, we restrict our attention to direct substitution, that is, that which is exercised by the irritants applied directly to the irritated tissues.

The first thing to be established is the gravity and the natural course of the disease. Next, the influence of the modifying agent must be ascertained; for it is above all necessary that the substituted disease be not worse than the one replaced. For example: agents which destroy the tissues by chemical or physical action are wonderfully adapted to disperse the lesions of these tissues; but destroying is not curing, and if the physician is sometimes forced to such measures, it is only when the local disease is so grave and incurable that destruction is indispensable.

But the therapeutic effect of the agent can hardly be anticipated, and experience alone can inform us how the vital properties react against the irritant cause. There seems to be a notable difference between quick-lime which makes an eschar in a few minutes, and the more slowly acting butter of antimony; one would be tempted to think that the action of lime would be more painful than that of the chloride, but experience shows the contrary; and in many local inflammations which are usually called spontaneous, and which differ from others only in conditions which are wholly independent of the cause, this difficulty in judging reappears. At the beginning of two anginas, in one of which there is a slight local inflammation with a membranous exudation and hardly any fever, and in the other the most energetic symptoms of inflammation and general reaction, it seems natural to think the one most severe which strikes hardest; and yet, while the latter does hardly more than to occasion a few days' discomfort, the former almost always kills by the septic and destructive nature of its principle.

The gravity of an irritation is judged neither from the nature of the pain, nor the order of appearance of the symptoms, nor their rapidity of development. If a concentrated solution of tartar emetic is dropped into the eye, only a slight stinging is felt; but if a grain of snuff falls in, the most violent irritation ensues, lasting for only a few minutes, while in the other case the eye is slowly injected, becomes inflamed, and the severest ophthalmia soon appears, often followed by loss of the eye.

The severity and the course of therapeutical inflammations, if we may so speak, are known only by experience, as in the case of pathological inflammations.



Therefore, before using substitutive treatment, we ought to know the range of our weapons.

Some of the irritants have a very short range; they produce very transient effects; such are the nitrate of silver, sulphate of zinc, nitrate of mercury, calomel, and the alkaline chlorides; of others the effects are much less fleeting, as cantharides, tartarized antimony, arsenic, the strong caustics, mustard, the euphorbiaceæ, the ranunculaceæ, the colchicaceæ.

As it is always necessary to proportion the intensity of the action of the substitutive agent to the inflammation, it would be absurd to attack superficial lesions with agents of the second series, which are suitable for grave, deep, or chronic lesions of tissue. Thus, malignant pustule and the variolous pustule are destroyed by a caustic; and superficial carcinoma of the skin, which is aggravated by superficial irritation, is destroyed by caustics that take off the whole thickness of the derma, or by irritants, like arsenic, which have a deep and prolonged action.

Two mistakes must be avoided in proportioning the substitutive action to the exciting irritation; we must neither do too much nor too little.

It generally does little harm to do too little; one may even, by following this prudent path, attain the same end, if the action is kept up and repeated. Suppose a blennorrhagia of the urethra, which we wish to cure with injections of nitrate of silver. We begin with a weak solution; 1 part in 3,000 of distilled water produces a slight therapeutical irritation which will not control the syphilitic phlegmasia, but will substitute itself for a part of it, so that, to use an inexact representation, we have a blennorrhagic irritation represented by 10, and a substitutive represented by 2. The substitutive not being proportionate to the irritation, the latter remains 8; but if we prolong the contact of the irritant solution, we may make up for its weakness by time.

This method is the more rational, as it is impossible to know beforehand the sensibility of the tissues, and as it is better to have to increase the irritation than to lessen it, when it has rashly been made excessive.

We said that each agent had its own range. The duration of action varies from a few hours to some days, according to the intimate nature of the modifier and the dose used.

The morbid irritation, as pre-existent, and as having deeply modified the tissue by simple duration, has acquired a sort of right of domicile, and a great tendency to reproduce itself. If the substitute acts only six, twelve, or twenty-four hours, it may replace the inflammation for that period; but if it be left off at once, the primitive condition returns. In order to produce effective substitution, the action must be renewed before the effect of the former application is entirely gone,

Thus, when dysentery is treated with injections containing nitrate of silver or neutral purgative salts, the pain, the colic and the bloody flow are lessened by the first injections; but they appear again in a week or



ten days; the rule here is, not to wait till the return of the dysenteric symptoms, but to renew the injections so often as to keep the patient continually under their action.

Assuming, as we have done hitherto, that all the patients are in identical conditions, and that no individual peculiarities come in play, it is evident that the substitutive irritation will be proportionate to the dose of the agent. But it is necessary to attend to what Brown called the exhaustion of incitability, in order not to use the remedy in vain.

According to Brown, each organic element has assigned to it, as to the entire system, a fundamental property—incitability. Stimulants develop incitation; but in this process the capacity for incitation, or incitability, becomes exhausted. It follows that the physician's part ought to be to restore incitability by rest, food, etc., that the same stimulant may always produce the same incitation; or else to increase the action of the incitant, in order that the incitation may remain the same, though incitability is lowered. In fact, this amounts to saying that the tissues and the system get accustomed to the various stimulants, and consequently are no longer excited by the agents which formerly so acted; that in consequence, in order to obtain the same result daily, the power of the excitant must be increased just in proportion to the diminution of organic susceptibility. The consequence of these principles is, that the dose of the substitutive agent must be gradually increased, not at an equal rate for all patients and cases, but in a proportion to be determined by experimental study of the patient's irritability.

From this great pathological law of Brown's there springs another essential application of substitution in acute or chronic diseases.

Doubtless the habit of inflammation in a tissue renders the tissue more apt to receive the same inflammation, but less apt to take foreign impressions. So, other things being equal, a more energetic irritant is required in a chronic than in an acute disease, and the importance of this rule becomes more evident when we think that, in addition to the loss of incitability, a necessary consequence of chronicity, we have also to strive against a prolonged vicious direction of the vital properties of the part, and against a deeply rooted disease; while in acute inflammations the substitution not only costs less, but does not require to be kept up so long.

Our remark upon the necessity of sustaining an impression, to prevent the disease from regaining its hold, leads to another precept which is, in a sense, the corollary of the former, namely, that we must not only repeat the action, but prolong it so as to cause the tissue to lose entirely the former habit of inflammation; the action of irritants must sometimes be kept up for weeks.

We laid down a rule, never to remove an ordinary inflammation at once; but some bolder physicians, after making a few preliminary trials to ascertain the susceptibility, double, treble, decuple the violence of the irritant, replacing the inflammation forcibly by a new therapeutic inflam-

mation. This is not always very prudent; but, while we are disposed to object to it in common cases, we desire to make it a principle in local diseases, the severity of which may in a few hours compromise life or the health of an organ. We ought to cauterize malignant pustule and its surroundings as quickly as possible, and to apply lapis infernalis to the conjunctiva when attacked by blennorrhagia.

Substitutive irritation must not be confounded with morbid inflammation, nor *vice versa*. It is rather worse to obtain too little than too much effect. If the inflammation is kept up by persistence in the remedy, it is sufficient, in order to cure, to stop all treatment; while, if the primary inflammation were still in existence, and were allowed to acquire force by a momentary suspension of treatment, the latter would have to be recommended.

Let us seek to establish a criterion, whereby we may decide whether the remaining inflammation belongs to the disease or the remedy.

When an irritant is applied to an inflamed tissue, the symptoms of inflammation are usually either increased at once, or experience a more or less considerable diminution.

If experience shows that the morbid secretion, the pain, or itching, are lessened under the influence of the irritant, the return of such symptoms will mark the return of the inflammation and the cessation of substitutive action. If, on the contrary, the substitute causes a marked increase in the pain, the secretion, the itching, etc., then a diminution in these symptoms will indicate the necessity of recurring to the modifying agent.

The former point is very easy to decide; but the latter is so hard that we think it impossible to be guided except by the long-tried results of experience.

In the majority of cases we do not try to remove the inflammation at a blow, and we cannot suppose the substitution to be complete; if, therefore, after twenty-four, forty-eight, or seventy-two hours, we find a decided diminution of the primary symptoms, we may infer that the remedy is acting, and that we may resume it; and, although the inflammatory symptoms which appear immediately under the influence of the agent are indistinguishable from those of pathological irritation, we shall have no other guide than the results of experience and analogy, which may be relied on with more certainty than rules which are subject to too many exceptions.

The Brownian principle which we stated, or, if preferred, the study of the influence of habit, lead to other therapeutical consequences. We have seen that the habitual use of stimulants lessens the incitability of a part. It follows that the habitual application of stimulants is a useful prophylactic against local irritation. This is well known to women who employ for the cure or prevention of acne rosacea, irritant lotions containing sublimate, or simply very hot water. Do we not see the habit of warm injections extinguish the sensibility, the contractility, and the secreting power of the intestine, just as the habitual use of highly-seasoned food



and gastric stimulants, far from producing gastritis, leaves the mucous membrane of the stomach in a state of organic insensibility which paralyzes all its functions. This truth was admirably shown by Brown, but ill appreciated by Broussais. In this way, workmen who are constantly exposed to a strong heat, far from having complexions like the people of the north, are remarkable for extreme pallor, as cooks, bakers, glass-blowers, charcoal-burners, etc., and the inhabitants of tropical climates. Those who specially treat disease of the skin know the immense value of the application of caloric, not less as a preventive than as a curative.

Hitherto we have paid little attention to the cause of the phlegmasia, and have treated it as if it were always of internal origin. Nor have we mentioned the state of the system. We have made the omission purposely, and certainly no one will be led to think that we neglect the importance of external causes. In internal inflammations the cure of the cause is sometimes the principal point; in other circumstances, this cause may be neglected without inconvenience. In most of the cutaneous syphilidæ the internal treatment is almost always sufficient, and topical treatment is almost superfluous; while in almost all dartres the internal treatment is secondary, and the direct agents hold the first place.

Admitting that the dartrous inflammation proceeded from an internal cause, it would not follow that we ought to confine our attention to that cause, for the cause may have ceased to act, while the local disease continues, exactly as the irritation may last long after the application of an external irritant agent.

The choice of the agent ought to be influenced in some degree by the internal cause, however inactive it may have become. For instance, nitrate of mercury must be preferred to nitrate of silver in syphilitic inflammation; the preparations of iodine to the salts of copper in scrofulous dartres, because each organic molecule is a sort of microcosm representing the general condition.

The applications of substitutive local treatment are innumerable. Most of the acute and chronic diseases of the skin, considered as local affections, are under the jurisdiction of this great method; and the same is true of diseases of the mucous membranes.

The treatment of traumatic erysipelas by ointment of nitrate of silver, of acute eczema by vapor-baths, sublimate, or washes of phagedænic water; the use of mercurial plasters upon the face in small-pox; the washes and ointments, alkaline, sulphurous or mercurial, in most herpetic maladies; the use of very warm lotions, and vapor-douches at a very high temperature, in many chronic affections of the skin, are all applications of substitutive treatment.

In the treatment of acute and chronic diseases of the mucous membrane, these applications are still more frequent.

In ophthalmia, and diseases of the nasal mucous membrane, nitrate of silver, sulphate of copper, sulphate of zinc, calomel, red precipitate, and very hot water, are used.

In stomatitis, and the severest and most obstinate angina, muriatic and nitric acids, dry chloride of lime, calomel, alum, sulphate of copper, nitrate of silver.

In croup and whooping-cough, cauterization of the upper part of the larynx; in chronic affections of the larynx and bronchi, inhalation of vapors of arsenic, muriatic acid, mercury, iodine.

In acute or chronic colitis, calomel, injections of nitrate of silver, of irritant salts, of sulphuret of potassium; the various injections which are thrown into the urethral canal and the bladder; perhaps the action of ipecac, of emetics, of certain purgatives in gastro-intestinal inflammation, and of the balsams in mucous flux.

This important method of treatment can only be summarily stated here; its applications in detail are given under the individual remedies.

#### TRANSPOSITIVE IRRITANT TREATMENT.

When two physiological or pathological acts of a certain value are performed at one time, the stronger one weakens the other. This is the interpretation of the celebrated aphorism of Hippocrates: "*Duobus laboribus simul obortis, non eodem loco, vehementior obscurat alterum.*" On this principle rests transpositive treatment. The problem is as follows: "Given a severe lesion, to produce artificially, in another place, a more energetic and less dangerous lesion, in order to attenuate the former."

The possibility of transposition is subordinate to circumstances which it is very important to state here, relative to the nature, seat, and extent of the disease.

*Relative to the nature of the disease.*—Some local lesions hardly change the texture of the organs, and are so mobile that they change their seat at the slightest perturbation. Among these are included neuralgias which have not involved inflammation of the nerve, rheumatism at its outset, the congestions and certain inflammations of the skin, such as urticaria, roseola, measles, etc.

Other lesions are marked by a very great adhesion to the organs, so great that sometimes no treatment overcomes it. Such are the eruptions of small-pox, most of the parenchymatous inflammations and organic degenerations.

Whatever attempt we may make with revulsives to arrest the progress of a pneumonia, a hepatitis, a pustular eruption of the skin or mucous membranes, we shall never succeed; the disease takes its course, unless other remedies are used. But, in the lighter affections of which we just spoke, an irritation applied to the skin or a mucous membrane often suffices to transpose the irritation.

*Relative to the seat of the disease.*—The acute phlegmasiæ of the mucous membranes are more generally rheumatoid or catarrhal—that



is, the irritation is transient, superficial, not tenacious; while in the parenchymata it is more obstinate and profound. This is doubtless due to the facility with which irritant secretions unload the tissue, while in the parenchyma the secretions are retained to become the cause of a fresh irritation. Whatever may be the explanation, experience shows that the transposition is easily made from a mucous membrane to the skin or another mucous membrane. Catarrhal angina often yields with extraordinary rapidity to an emetic, a purge, a simple sinapism; and so with certain forms of bronchitis, coryza, gastritis, enteritis, and colitis; in this case the irritation of the mucous membrane is probably rheumatismal in character. One equally advantageous result does not follow, even in slight phlegmasiæ of the parenchyma. The transposition is not so easy in parenchymatous affections, except when the irritation has produced only congestion, or when the acute symptoms are already dissipated.

*Relative to the age of the patient.*—Not all the phlegmasiæ have an invincible tendency to suppuration like the variolous inflammation of the skin. Some can be checked without very great difficulty, and have not a predetermined course. We do not doubt that in many cases pleurisy begins and is aborted quite unknown to the physician; that it is the same in pneumonia and inflammation of the tonsils. In this case nothing but a simple congestion exists, due to a local irritation or a general cause. There is as yet no such local lesion as to cause any great sympathetic trouble; a slight diarrhoea, an epistaxis, an abundant sweat, a foot-bath, conjure a disease which would probably have been severe if the transpositive irritation had not been developed at a remote part.

But if an irritation causes something more than simple congestion, and a true inflammatory fluxion exists, the irritants can seldom displace the inflammation; they usually aggravate it unless the revulsives are very powerful or the inflammation very light. Velpeau caused diffused phlegmons of the leg to abort by covering it almost entirely with a blister; and it was formerly the custom with certain physicians to cover the chest with an enormous blister in all periods of pleurisy and pneumonia, whereby they often aborted the inflammation. This is also the practice of M. Gendrin, who thinks highly of it. But it is a practice which we should not dare to apply, and which we should never advise unless a well established experience showed its value.

When the acute stage of inflammation is past, if the fluxion persists, and the other inflammatory symptoms do not disappear, we may infer that the irritation no longer exists, and may then employ revulsives to advantage.

As the occasion offers, we owe it to our readers to explain ourselves clearly upon the preceding paradoxical statement.

The physiological school presume the inflammation to exist until all the inflammatory symptoms are past; we believe that there may be little or no irritation at a period when certain inflammatory symptoms are at their height.

We do not think that the primary results of irritation have been suffi-



ciently distinguished from the secondary; the immediate consequences are increased vascularity (sanguineous congestion), the consequent swelling, pain and heat. But what would become of these symptoms if the irritation were to cease at once? Swelling and pain would remain, while the active fluxion and the heat would disappear almost immediately. Swelling would remain, because morbid products would be effused in the parenchymatous framework or the cellular tissue, and pain, because of the mechanical distention; just as when an irritation of the pleura or peritoneum wholly ceases, we may yet find abundant morbid products in the serous cavity, though the cause for them has long disappeared. Thus, two of the most capital phenomena of inflammation, swelling and pain, may exist in a high degree without irritation.

We suppose a sudden disappearance of irritation. Though this hypothesis may sometimes be realized, it is quite rare; irritation usually goes gradually, and the inflammatory phenomena afterwards depart readily. But a slight irritation may inhere in the part, and become a constant cause of afflux of fluids, and of other symptoms of chronic inflammation; in this case transpositive revulsion must be long continued, until the part has lost the habit of suffering.

Thus, transpositive medicine is indicated in the beginning of phlegmasias when only congestion and a moderate inflammation are present; it is usually prescribed in the height of the attack, and is reapplied when there is reason to suppose that the inflammation has become less intense, even when the swelling or effusion are not diminished.

*Relative to the extent of the disease.*—If the morbid state were one, transposition would always be easy, in inverse ratio to the extent of the disease; it may be stated as a principle that this is the case when we have only similar lesions to deal with; but the extent is a less important thing to consider than the nature and duration.

A catarrh covering an immense surface of mucous membrane may be transposed with ease, but the most energetic revulsion is powerless over a little ulceration or the most simple dartre. Before employing the revulsive, we must know by experience what inflammations can be transposed; after this, we must proportion the extent of the application to the extent of the inflammation. The neglect of this principle is the reason why revulsion has fallen into discredit.

In suffocative bronchitis a small blister is put to the leg or sternum, and if relief is not immediate, the weakness of the remedy is blamed, instead of the unskillfulness of the physician. How can a bronchial phlegmasia, occupying perhaps some square metres of surface, be drawn away by a blister of some centimetres' surface?—one may as well expect a severe congestion of the chest to be relieved by the letting of a few grammes of blood. We must do what Velpeau did so successfully. He knew that the treatment must be proportioned to the intensity and the extent of the inflammation, and we have seen him arrest deep phlegmons which threatened frightful results, by blisters which covered an entire limb. Thus is



explained the success of M. Gendrin, who does not shrink from covering one whole side of the chest with an enormous blister at the beginning and the height of a pleurisy or pneumonia.

The want of extension, in transpositive inflammation, is made good by the intensity of the action. We need not despair of deriving a capillary bronchitis, though it be impossible to blister a surface as large as the outspread bronchi, for we may by cantharides inflame the skin to a great depth and thus make intensity compensate for extension.

*Relative to the nature of the disease.*—It is impossible to transfer a phlegmonous inflammation to another point, and the same is true of certain specific inflammations. We may try in vain to drive away a syphilitic chancre, or a diphtheritic angina with a blister. Darts in the adult, and the rashes called gourmes [*crusta lactea*] in children, are in the same case. Blisters and issues are a standard remedy in gourmes and darts; it is most important to study their influence upon these affections.

Let us recall certain facts.

An irritant application made to the skin often causes a general phlegmasia of that organ; a Burgundy pitch plaster, having caused the local development of a great number of vesicles, sometimes occasions a general eczema, at first acute, which may afterwards become chronic. The application of croton oil or mercurial ointment may, in certain cases, produce the same accidents.

But few years pass in a hospital with female patients, without an explosion of eczema due to a badly dressed blister. In 1840 we had a female patient in the Hôpital Necker to whose thigh we ordered the application of a flying-blister to cure a rheumatism; it was dressed with gummy diachylon plaster. A few days later there appeared around the sore a vesicular eruption which soon invaded the whole surface of the body, causing high fever; this condition became gradually quieted, but was replaced by a pemphigus which lasted some months and required the long-continued use of sublimate baths. We lately applied to an old woman's temples two ammoniacal blisters for temporo-facial neuralgia; they were dressed with diachylon, and in a few days an eczema appeared on the forehead, and soon the face, neck, and arms were invaded, and the accidents were not calmed without great difficulty.

This singular tendency to contract cutaneous phlegmasias, very rare in men, but a little less so in women, is common in children. How often have we seen, both in and out of hospitals, an acute, simple, or impetiginous eczema attack a poor child after the application of a flying-blister to relieve pneumonia? The affection is mostly chronic; and, considering that the children had previously no cutaneous troubles, we must admit that the blister was, if not the full and radical cause, at least the occasional cause of the manifestation of the disease.

We may then state formally, that the blister often gives rise to "gourmes." Hence, as a preventive of such rashes, it often fails, and even frustrates its own end.

If we are accustomed to young children, we may be able to guess beforehand whether the skin will become widely inflamed after the application of a blister or any other agent capable of producing active and persistent local phlegmasia. Such a prediction may be erroneous, but it enables the practitioner to be on his guard.

We must not use blisters as a preventive of gourmes upon blond or red-haired children, with a very fine white skin and very red cheeks, nor upon those who chafe and suppurate when not strictly cared for, nor those whose parents are dartrous. We must not leave a blister upon those whose skin becomes irritated around the sore.

We have seen in our wards at the Hôpital Necker a young child which had had a slight lichen for several months and limited to a few points of the skin; a physician ordered a permanent blister, and in a few days the arm to which the exutory was applied was covered with an eczematous eruption, which soon invaded the entire body.

We have seen many children affected with gourmes; in accordance with routine and theories, we have applied permanent vesicatories; we have often had to repent and very rarely to be pleased with the treatment.

In general, blisters must be forbidden in such cases. But they are not forbidden in the cases we are about to specify.

We forbid them when the rash is cutaneous.

We usually advise them when the mucous membranes are affected.

We forbid in the former case, because experience shows that if the rash is on the skin, the blister makes simply one point more, without any benefit as regards the other points.

We advise it in the second, because experience shows us that a cutaneous trouble behind the ears, or on the scalp, very often alternates with an ophthalmia or a chronic eczema of the nasal fossæ, as if there were an incompatibility between them. In this case the application of a blister to the arm is commonly useful, though sometimes the disease remains obstinately in its old seat and refuses to take the new road. In this case we may give up the permanent blister, but not hesitate to call the fluxion to the point where it most readily and most beneficially places itself.

But if the blister is useful in alternative rashes (to use a rather incorrect expression), it is no longer so when the rash which invades the mucous membrane is propagated from the skin, instead of being a compensation for it.—We have often seen an impetiginous eczema gradually invade the forehead, the eyelids, the conjunctiva, the rest of the face, and penetrate within the nose; this we call a propagation. Here the blister does not succeed. But when the ophthalmia takes the place of eczema of the skin, which again takes the upper hand when the ophthalmia ceases, we have alternation, compensation in some sense; in this case the blister is commonly useful.

But if useful in those seesaw rashes, the blister is imperatively de-



manded in bronchitis, enteritis, and pulmonary or intestinal catarrh, diseases which, alternating with skin-rashes, are truly the manifestation of the same diathesis—which a true pathologist should never forget.

*Mode of action of transpositant agents.*—It would greatly embarrass us to have to say by what internal paths the revulsives act; the explanations of pathologists have not made the question clear, and we freely confess that we have vainly sought the explanation. The phenomenon occurs spontaneously during diseases, usually at the beginning or in the decline, rarely at their height. This may be proved, but is as inexplicable as most other intimate organic acts.

If in the course of one phlegmasia another is spontaneously developed, while the former disappears, this is considered by the physiological school a transpositive revulsion; for revulsion and metastasis are confounded by Broussais. But this pathologist has a sophism here, which relates to the order of appearance of phenomena. Take, for example, the parotids.

We know that the inflammation of this region sometimes removes to the testicle or the mammary gland. If the inflammation in the testis began while the parotidean fluxion was at its height, and if the latter did not begin to diminish until the former attained a certain point, we might well think that here was a case of revulsion. But remark, that the disappearance, nearly or quite complete, of the swelling of the parotids, precedes the pain and swelling of the testis. How can this be explained but by something wholly different from revulsion? and how can we help seeing that the pathologists were right in separating revulsion and metastasis? We easily admit that when the metastasis is completed the new inflammation may exercise a transpositive revulsion upon another phlegmasia, or even on the remnant of inflammation which lingers in the organ first attacked; but we must confess that the metastasis is the first phenomenon, the metastatic inflammation the second, and the transpositive revulsion the effect of the latter.

Leaving out the much debated question of metastasis, let us suppose that the spontaneous phlegmasia which acts as a revulsive antedates the transposition.

It is necessary next to attend to what we said above, to wit: that the inflammatory fluxion may persist after all irritation has ceased; in this case the slightest irritation will easily act as a revellent, in a condition commonly supposed to be an active inflammation, but which we shall not explain any better.

From the point of view of the physiological school, and admitting that the activity of revulsion is always in proportion to the amount of irritation, it will be asked how an irritation can go through all its stages, from the embryo through germination, and up to a point of development at which it preponderates over others, when all the time a powerful phlegmasia exists, which ought easily to practise revulsion upon it? If it be a principle that a stronger irritation produces revulsion upon a weaker,

an established phlegmasia would never suffer another to settle in the system.

But we see several phlegmasiæ marching side by side, each keeping its own course, and modifying one another but little, except in some symptoms. Among morbid causes there are some which produce disease independently of any interior circumstance. We may see small-pox and dothineritis, small-pox and vaccinia, and (in Bretonneau's celebrated instance) small-pox, dothineritis and dysentery, each with its specific form and character. We see that in this case revulsion acts only upon the inflammatory fluxion, not on the disease, which will keep on its way at all events.

The specialty of the causes of inflammations will easily explain that which the theories of the Val-de-Grâce left unexplained, to wit, that a disease in which irritation plays at first only a very secondary part may develop in the shadow of a grave phlegmasia, and may at last exceed the former in the severity of its inflammation, and may exercise a transpositive effect in diminishing it. We are led to believe that spontaneous transpositive inflammations are produced by specific causes, often inappreciable, set in operation by the primitive disease; and this is very probably the case with most of the spontaneous revulsive phlegmasiæ.

But a number of spontaneous phlegmasiæ, of identical causation, will not always act as mutual revulsives. In small-pox the inflammation of the skin of the arm, however acute and intense it may be, will never have a revulsive effect on that of the leg, for the variolous poison is one cause with a multiple effect. If we pass from a cause with acute effects to one with chronic effects, we find that multiple syphilitic phlegmasiæ of the gland, cervix uteri, the bones, pharynx, larynx, skin, do not act as mutual revulsives.

This is true as regards syphilis and small-pox; but the common symptoms of all local phlegmasiæ, namely, the sanguineous fluxion, do act revulsively upon one another to some extent. For example, swelling of the hands and feet in variolæ does make that of the face disappear, as the appearance of the eruption puts an end to the prodromal symptoms.

*Duration of the transpositive revulsion.*—The revulsion is divided into mediate and immediate; the immediate is rapidly ascertained, often in a few minutes. A mustard foot-bath relieves a headache or pain in the throat at once; a sinapism relieves a superficial rheumatic pain at once. A large ammoniacal blister suddenly dissipates the orthopnoea of bronchial catarrh. These results are so frequent as to have put revulsives in great and deserved honor. And when less immediate, the results may still be remarkably prompt. Improvement often occurs in less than twenty-four hours, in acute catarrh after a purgative, in catarrhal angina after an emetic, and in pleurisy or pericarditis after the application of a very large blister.

This treatment shows its value at once; it is important to know this,



for the patient's condition is commonly aggravated by persistence in painful revulsives, if after twelve or twenty-four hours they produce no good result. They then excite instead of transposing, a mode of action which we will study in one of the following chapters.

The immediate revulsion is only applicable in acute disease. Its action is essentially rapid. We have given the conditions under which it is to be used in acute disease.

Slow revulsion applies to chronic disease; but its action is always mixed. As an irritant of the skin it doubtless causes some fluxion, but its action is far more by spoliation of the elements of the blood and derivative spoliation.

In the next chapter we shall study spoliative treatment by itself; we shall here regard it from another point.

A copious suppuration has been observed to bring on marasmus, unless the loss were compensated by abundant nutrition. On this fact spoliative treatment is founded; but there is another fact, namely, that a suppuration, situated for example at the upper part of a limb, rapidly causes atrophy of the limb, probably because a part of the arterial supply is diverted from the limb to the suppurating spot. Two things are then to be considered; a local irritation which draws blood to a part, and spoliation of the elements of the blood—that is, transpositive and spoliative revulsion at once. These two forms are mingled, for in immediate transpositive revulsion the blood or its elements are strongly attracted toward the point of revulsion, and in the other the elements of blood are drawn and slowly poured out from the system. There is only this important difference, that in one case the intensity of the irritation is the leading phenomenon; in the other it is the abundance of spoliation. Hence spring naturally the rules which should direct us in the choice of revulsives. For the most acute and rapid diseases, take revulsives that act directly; for congestions, take mustard, caloric, urtication, flagellation, cupping. To recall eruptions to the skin use the same, but longer. For acute energetic phlegmasiæ, ammonia and cantharides. For chronic affections take antimonial ointment, the permanent blister, and especially the issue or seton. Atrophy of limbs caused by morbid or therapeutic suppurations upon them leads to the use of cauteries and setons not only for resolving chronic engorgements, but also to produce atrophy of the tissues in which excessive nutrition exists. Thus, issues and setons over the regions of the heart, the liver, the spleen, to modify the nutrition of these organs if hypertrophied.

When the transpositives are used, the duration of the symptoms they are directed against must be carefully estimated, to save the patient from needless pain and perhaps dangerous therapeutic effects. We will give, as an example, cholera. The indication for revulsives hardly exists in cholera except during the cold period; the life which seems about to fade away must be recalled to the skin at any rate, and the means of cutaneous stimulation cannot be too many. Whether the irritants act as gen-

eral excitants, or as transposing to the skin the internal fluxion which is supposed to attack the digestive organs, in either case, the indication for revulsives exists only in the cold stage; as soon as reaction begins, far from seeking to increase the points of inflammation, we must do our best to extinguish them where they appear. In irritating the skin during the first period, we are obliged to look for methods of sufficient energy, and yet of such a transitory nature that they leave no traces during the second period. Urtication and mustard do this admirably; if blisters with ammonia or cantharides could produce the same results at once, they would still compromise the patient's safety subsequently by the excess of fever they provoke. We have taken cholera as a type, but there are few diseases in which we do not sometimes have to do the same. At the onset of an acute disease, if the blood, which is so important in most affections, is only in the condition of congestion, a rubefacient is indicated; a topical agent which might cause a continued inflammation is to be feared, for it may become a source of prolonged and needless suffering, or perhaps of general excitation. The same rule should be observed when we have ground to suppose that we shall have to continue this treatment several days, for one may safely place ten sinapisms a day on a patient's body, but not that number of blisters or issues. In general, the revulsive irritatives should be limited in extent, in proportion as they are energetic.

*Place for revulsion.*—For this purpose we should choose a tissue in which the artificial malady will not be more severe or troublesome than the one we are combating. Experience points to the skin and mucous membrane as those which best endure irritations. The systematic statements of Broussais concerning the pathological and physiological supremacy of the stomach and intestines have only been accepted by those ignorant of experimental pathology and physiology. When we compare the structure and functions of these two membranes, we find that if a prompt irritation and a rapid and abundant secretory evacuation are required we must address the mucous membrane. Thus, in angina, in pulmonary catarrh, in certain superficial cutaneous affections which may safely be caused to disappear, an emetic or purgative will act with more benefit than any irritant applied to the skin; and this is readily understood when we think of the immense surface of mucous membrane and the abundance of the secretion which the contact of an irritant produces. If we require a transient and superficial irritation, to be renewed every day, the intestinal canal should always be preferred to the skin; thus, in chronic headaches, in frequently occurring congestions of the brain or lungs, in chronic ophthalmia, no revulsion takes the place of a daily purge. But if we require a deeper and more continued irritation, we must appeal to a membrane whose functions are not so essentially related to nutrition, namely, the skin. With the invasion of the physiological doctrine, revulsives to the intestinal canal were banished from therapeutics, and the skin alone had to bear the burden of all inflammations; but



within a certain number of years the purgatives have been properly resumed.

A suppurative inflammation may be situated in the skin for a life-time without doing any harm to the system; it ought, therefore, to be selected for all very protracted revulsion. Besides, we may choose what portion of skin we will; whereas if we use the digestive tract, we must irritate the whole of it, unless we make rectal injections.

There is nothing exact in regard to the portions of skin or mucous membrane which we ought to prefer; but some general rules may be given, as follows.

Experience shows, though it may not be easy to explain the fact, that certain parts of the body are connected with other distant parts by functional ties which may properly be called sympathies. These are infinitely less in number than Broussais and other solidists pretend, but some such do exist. The womb and the breasts, which are physiologically connected, have also a pathological sympathy; whence the precept of Hippocrates, to apply cups to the breasts of women affected with metrorrhagia; and the general principle of soliciting blood to the uterus in women threatened with scirrhus or cancer of the mammary glands.

The suppression of certain fluxes, certain fluxions, or certain morbid accidents, as rheumatism, gout, etc., is a frequent cause of disease. The aim of the therapeutician should be to recall these, by revulsives, to their former places.

It is manifest that when an habitual epistaxis or a chronic coryza is succeeded by an obstinate headache or a laryngeal catarrh, the treatment must produce a new irritation in the mucous membrane of the nasal fossæ by the use of mercurial powders, hellebore, etc.; and if the discharge from piles is suppressed, and replaced by symptoms which seem caused by such suppression, the best revulsives will be antimonial suppositories and cups to the margin of the anus; and warm or sinapized foot-baths, cups to the thighs, and sitz-baths, to recall the menstrual flow, in case suppression causes alarming symptoms.

The suppression of one disease sometimes gives rise to another that is worse, as in the case of piles or coryza; we ought then to prefer the light affection to the severe, and to do everything to re-establish the former, but the patient often wishes to get rid of both. We have known a young woman troubled with leucorrhœa and engorgement of the womb for years; she wished to be cured; but as soon as the uterine flow disappeared, she was troubled with hæmoptysis and all the signs of incipient tubercle of the lungs. Fortunately, she had a miscarriage which brought back the uterine flow and the leucorrhœa; and all the morbid symptoms connected with the lungs soon ceased. She then applied to us to be cured of her leucorrhœa, but we positively refused to do anything until she allowed a large issue to be placed upon her arm. The issue was applied, the uterine affection was readily cured, and the trouble with the lungs did not return.

When the cure of a chronic phlegmasia gives rise to grave symptoms, we must either re-establish the former affection, or at least fill its place by topical agents which maintain at one point of the skin a permanent inflammation and an abundant suppuration; and here the blisters, issues and setons play the chief part.

As regards the most suitable place for applying revulsion, in given cases of disease, the practice is so contradictory and the observations are so few that we shall take the part of simple narrators, and refrain from an expression of opinion.

Some, for example, for irritant affections of the brain, direct mustard foot-baths and blisters to the legs; others apply cups, blisters, setons or moxas to the nucha to satisfy the same indication. Some, in acute or chronic thoracic inflammation, prefer revulsion by the walls of the chest; others prefer to irritate the skin of the arms and legs. Some, in engorgements of the liver, irritate the mucous membrane of the digestive tract as much as they can, and chiefly the lower part of the rectum; others prescribe these methods, and direct revulsives to the skin and cellular tissue of the right hypochondrium. Some make it an invariable rule to place the revulsive between the heart and the affected point, so as to intercept the circulation and draw off the blood or some of its elements before it reaches the inflamed tissue. It would be hard for us to say whether these rules are founded in reason; experience must be the judge in such cases. Usage, which perhaps is not the best rule, generally directs that in order to cure congestions, we should apply the excitant to a part which receives a different blood-supply from that which is distributed to the congested part. To solicit congestion of the uterus, which is supplied by a division of the iliac artery, we apply to the legs topical irritants capable of drawing to the capillary extremities of the femoral artery; which like the hypogastric is only a division of the iliac; while on the contrary, we use exactly the same means to avert congestion of the brain, which is supplied from the carotid and the subclavian. The mobility of the blood, when congestion only exists, renders this distant effect easy; but when a phlegmasia is commencing, or the inflammation is beginning to fail, the transpository irritants must be placed in contact with the skin near the affected region. It is the same with spoliative treatment, unless our object be to bring back a fluxion to a point whence it has disappeared; thus, when the healing of an ulcer on the legs is followed by a chronic phlegmasia of the thoracic organs, it is better not to put an issue or a seton in the walls of the chest, but to make an issue in the leg where the ulcer was, or to make the old sore suppurate with a permanent blister.

The seat of revulsion is most important to decide when we wish to produce atrophy of an organ, or at least to arrest the excess of nutrition, which may soon occasion functional trouble. Thus, when iodine fails to cure hypertrophic goître, the forming of an issue over the tumor is perhaps the simplest remedy, as in simple hypertrophy of the heart it is



useful to keep up large surfaces of the suppuration on the skin of the præcordial region.

One word more. Do all these facts, verified as they are by medical tradition, find an explanation in modern physiology? Must we admit, for instance, that reflex action gives a sufficient account of them? It is certain that some substances which do not change the coarse structure of tissues to which they are applied may produce in the deep-seated organs, by reflex action, important and perhaps even permanent modifications; but the case is quite different with revulsion.

In revulsion we produce at a point a more or less permanent lesion, and not a transitory effect, as when we wish for a reflex action; besides, in order that the reflex action may be active, it is necessary that the spinal cord be separated from the brain, etc. Yet we do not deny that in revulsion reflex actions occur; what we do deny is, that revulsion is accomplished simply through a reflex action.

We believe that the theory of revulsion is to be derived entirely from the application to biology of that great discovery of the unity of physical force, and of the equivalent transformations of its different modes; of which discovery, the determination of the mechanical equivalent of heat is but a fragment.

Man has only two sources from which to draw the force which he requires, food and respiration; he expends it in muscular labor, secretion, mental labor, etc. The difference between these two terms represents growth and excretion. In the total of expended force, the modes of expenditure vary with the nature of the life; one expends more in intellectual labor, another in mechanical toil, a nurse in lacteal secretion, etc.

It is very probably the same in pathology. In a given affection, one element will assume a leading importance, and the morbid labor may at a given moment undergo a total transformation into another equivalent form of labor. We consider this the true scientific formula of crisis of metastasis, and, in particular, of revulsion. We may perhaps say that revulsion or derivation consists in establishing upon an organ of minor importance an artificial action which is without danger to the system, to replace the morbid action; that is, to form its equivalent.

*Choice of revulsives.*—Experience gives us the law, that in order to produce a good revulsion, we must as far as possible establish an artificial pathological action of the same nature as that of the disease we wish to attack. To congestion we oppose rubefacients; to exudative phlegmasiæ, blisters and the irritants which produce exudation; to suppurations, revulsives which produce pustulation, and issues.

#### SPOLIATIVE IRRITANT TREATMENT.

Spoliation, in the therapeutical sense, occurs whenever one or more of the elements of the blood are withdrawn from it, in a greater propor-

tion than is due to the normal processes of organic composition and decomposition.

The abnormal secretions are merely exaggerations of the regular secretions of the economy, and spoliative treatment is applied solely through the excretions. The secretion of pus is doubtless more than an exaggerated normal secretion; but in any case, it is always one or more of the elements of the blood that are secreted.

Ptyalism, diarrhœa, bilious or mucous vomiting, the various catarrhs, diaphoresis, diuresis, are the agents of spoliation. We shall speak at a later time of evacuants, that is, agents which increase the secretion of the alimentary mucous membrane and its appendages; and of antiphlogistic treatment, in which spoliation by the direct evacuation of blood-vessels is the chief feature; of diuretics, sudorifics, etc. We shall here speak of only a portion of spoliative medicine, that which acts through suppuration.

Chemical analysis has demonstrated serum, albumin and fibrin in a new state of combination in the pus; from which it follows that suppuration necessarily draws from the system all the principles of the blood except one, the cruor.

Omitting for the moment the local and sympathetic irritation which necessarily accompany suppuration, we will study first the isolated fact of spoliation.

If most of the elements of the blood are used without profit to nutrition, daily and momentarily, the expenditure must be out of proportion to repair, and the organs will have a tendency to atrophy. This is what occurs after all abundant suppuration; and marasmus is the necessary consequence. The diminution of the blood in the vascular channels must, and always does produce this effect. Physiological experiments show that bloodletting singularly assists absorption; now a partial and continued bloodletting, like suppuration, produces the same result, but slowly and insensibly.

Resolution in phlegmasias is simply interstitial resorption in a special organ, as emaciation is interstitial resorption in all the tissues of the economy.

We will here give a brief attention to certain phenomena of secretion in inflamed organs.

In the first stage of inflammation there occurs an active flow of liquid to the part: after which, the interstitial secretion increases, and, in certain organs, attains an extraordinary abundance. This abundance is nowhere more considerable than in the large and small cellular cavities, as the serous sacs and the cellular tissue proper. In parenchyma which has a degree of resemblance to cellular tissue, as the lung, the morbid interstitial secretion is almost as great as in the cellular tissues proper.

While the cause of inflammatory fluxion—the irritation—persists, the fluxion itself is always in excess of absorption, and the swelling keeps increasing; but when irritation ceases, and the general harmony of the



forces is re-established, resorption occurs with a rapidity proportioned to the number and vascularity of the cavities in which it is contained, and the abundance of the secretion. Hunger is a most certain sign of the activity of interstitial resorption; when convalescents are hungry, absorption is going on with unusual intensity in the tissues which have just been the seat of phlegmasia.

It is at first hard to see why interstitial absorption goes on with prodigious activity in a lung which has lately been inflamed, while it is null or almost null in the healthy tissues, the muscles, liver, spleen, kidneys, etc. It is because the blood, when once converted into a framework or a parenchyma, lives a more energetic, complete, and individual life, and as a living body gains the power of resisting the absorbent action of the vessels; while fluids exuded in the cellular tissue possess but an incomplete organization, and have only the life of organic molecules; they have the faculty of becoming tissues—but as yet, no individual existence. They are therefore the first to be attacked by the interstitial digestive forces, as are the alimentary substances in the digestive tubes.

A constant suppuration at one point of the body, by causing a constant depletion of the sanguine system, continually starves the organs of absorption (if we may use the expression), and consequently favors the resolution of effused inflammatory products.

Whenever a chronic phlegmasia exists at any point of the body, and irritation has nearly or quite ceased, while the morbid effusions remain in the serous cavities, or in the parenchyma; or when the products are effused externally as in the case of the mucous membranes and the skin, it is the physician's duty to establish a point of suppuration, if he has not obtained a cure by the ordinary means.

Spoliation by exutories, however continuous, is not so active that it can balance the restitution made by a rich alimentation which furnishes more than the system needs. The patient, therefore, while spoliative treatment is continued, must be subjected to such a regimen that repair is below the requirements, in order that the exutory may not lose its activity. It does not follow that we must always restrict the diet where an exutory is applied. Dieting, or at least a somewhat severe regimen, is necessary so long as morbid products remain to be absorbed; but afterwards the severity of the regimen may be relaxed, as the exutory no longer needs to act by spoliation, but by other properties of which we will speak hereafter.

There is a very grave question in medicine, which has for centuries been considered as settled, and which is hardly discussed at present by pathologists; it is the question of the spoliation of certain degenerated humors by exutories. At the time when pathology was ruled by the idea of the humors, it was firmly believed that the exutory acted only by removing the peccant material from the blood; a depurative action. Such an opinion had the advantage of striking with a material fact; the vulgar, and the doctors too, who cannot always be distinguished from the

vulgar, were the more convinced of depuration, as they saw it proved by the senses. For more than sixty years the solidist doctrines have governed the medical art in their turn, and yet physicians hardly dare to brush against a popular view which is so profoundly rooted and so vigorous.

Certainly no one will suspect us of wishing to revive absurd humoral notions, or to wish to revive the question, whether the pus discharged by a seton existed before the match was applied; but there is an element of truth in the pretended depuration, which we will state.

To make ourselves clear, we will recall a fact which has certainly been noticed a thousand times by physicians, and to which Bretonneau was the first to call the attention of pathologists. A man may for years receive slight wounds with impunity, and even very deep wounds, without suppuration ever appearing; everything unites most readily by first intention. He has what may be called a healthy skin. But if by chance he receives an injury of such a nature that suppuration is a necessary consequence, he will subsequently, and perhaps for a great many years, suppurate on the slightest occasion, and will have what is called "a poisonous skin," that is, a skin which is poisoned very easily by wounds, even if slight. Furuncular eruptions, anthrax, phlegmasias of bad character, will be often observed in him, and frank inflammation, even of the internal organs, will pass into suppuration more readily than in other patients.

It is also observed that patients who wear an issue or a seton do not suffer from the troubles just named while the suppuration is kept up; but that the troubles appear at the moment the flow of pus is suspended, to disappear again when the exutory is re-established. Further, in persons thus disposed to suppuration, issues and setons give a much more abundant discharge of pus than in other persons.

Is it, then, absurd to claim that the blood contains, if not pus, at least elements which will turn to pus with deplorable readiness; and that the irritation caused by the pea of an issue, or the string of a seton, in calling an inflammatory fluxion to a given point, attracts towards that point the molecules of blood which have a tendency to become pus, and exhausts (if we may so speak) the purulent leaven of the blood? In this point of view an exutory is a real depurative agent, in the sense in which the physicians of old time understood it.

Let us pass by the explanation, and come to the practical result. If by the aid of an actively sustained exutory we put an end to the disposition to suppurate, we also lessen the chances of all diseases of a bad type; of those parenchymatous suppurations which are so destructive, and so ready to appear, in the condition of which we now speak. The exutories will in this case be ordered rather as a prophylactic than as a remedy.

On the other hand, if the suppression of an issue, a blister or a seton causes a general tendency to suppuration, we must be more cautious than is generally the case in ordering the suppression of the suppuration, or must take the precautions which our predecessors have so much insisted upon.



It is easy to see how grave a matter may be the suppression of an exutory which has been worn a long time. First, the system is accustomed, and with benefit, to the secretory servitude. The morbid secretion has become constitutional, and therefore cannot be suppressed without a great general perturbation; and besides, the system retains for a long time a tendency to suppurate which has its dangers in case a phlegmasia should occur.

From what we have said it does not follow that we regard exutories as indispensable in the treatment of all chronic phlegmasias, and after all suppurations, and that we never permit their suppression. We only wish to say that exutories must always be replaced by other spoliative agencies, at the head of which we put purgatives, sudorifics and diuretics. The long-repeated use of these is a powerful method of diversion, and if our predecessors have prescribed them to excess, they have been proscribed in our day with a rigor which is not justified by the former abuse.

The choice of an exutory is not indifferent. Our sole aim is to withdraw a portion of most of the principles of the blood. The local irritation, a necessary condition of suppuration, must be as slight as possible; of all methods, the issue is certainly the least painful; the seton comes next, which gives a little more pain, but by the abundance of its discharge causes a very abundant humoral evacuation. The seton may, therefore, be preferred as a remedy, and the issue as a prophylactic. We must use the seton in chronic visceral phlegmasias, in inflammations of the mucous lining of the great splanchnic cavities. As to blisters, the sharp pain which they almost always occasion, the difficulty of dressing them, and the inequality of the suppuration, ought to cause their disuse as general spoliative agents, though they form an heroic remedy to fulfil the other indications of irritant treatment.

We have passed over the local and sympathetic irritation provoked by an exutory, independently of spoliation; but this part must not be neglected. For there is a double, and sometimes a triple therapeutic action, to wit: a transpositive, an excitative, and a spoliative action. We have already stated our view of transpositive treatment; and shall next attempt to explain under what circumstances irritation of the skin becomes a cause of general excitation.

If we pass in review the spoliative agents, we shall find that the exutories are the least injurious of all. It is doubtless convenient to purge, to produce sweating or diuresis; but as these results are always obtained by an irritation applied to a large surface, or an active modification of the entire economy, the organs do not always get accustomed to this continuous perturbation, but may become fatigued or inflamed, or lose their irritability, and a too-dearly bought treatment has to be abandoned. Of small daily bleedings it is impossible to think seriously, though it has been advised by the exaggerated and rash partisans of the physiological doctrine.

But the application of an exutory, considered as a local irritation, is rarely dangerous, even in the slightest degree; except in persons so excitable that they could not endure any other spoliative remedy. Considered as a spoliative, the exutory, by the slowness and the continuity of its action, and the ease with which its effects can be measured and graduated, will always hold the first rank among the agents of spoliative treatment.

#### EXCITATIVE TREATMENT.

We have seen topical irritants applied to the human body for the purpose of substituting a therapeutical inflammation for one already existing, or in order to carry to a given point a phlegmasia existing in another place, or to solicit a continued flow of the elements of the blood and a kind of derivation.

We have said that these attempts are often mixed, and can never be obtained perfectly isolated. There is a fourth mode of action, which is hardly distinguished from the two preceding, but which, like them, acquires a special predominance under some circumstances.

The local irritants, as giving rise to an inflammation, produce the consequences of all inflammations, to wit, a local fever always, and sometimes a local and a general fever at once.

The reaction of the system against morbid agents, called fever, is a necessary and often useful incident of almost all acute diseases.

It may sometimes be beneficial to excite fever, and there will often be many advantages in preferring an irritant applied to the skin rather than an excitant which acts by absorption. We do not share the belief, which of late has prevailed too widely, that these excitants are dangerous, owing to the gastritis and the gastro-enteritis which they occasion. It would in truth be hard to find among the excitants any agent which might be considered as a topical irritant in prudent doses. These puerile fears do not stand in our way; but experience shows that the remedies which enter by absorption do not always have as simple a mode of action as those which appeal to the nervous system alone, doubtless because they are carried by the circulation to stimulate all the blood-containing organs, together with the nervous centres. The cutaneous irritants evidently act on the nervous system alone, and in this respect are closely allied to caloric. Thus, when the Brownian excitability seems extinct, and when, febrile reaction diminishing, the other symptoms become aggravated, we must employ sinapisms, flying blisters, and the various irritant applications almost exclusively.

We have, in speaking of cholera, remarked upon the harmfulness of exaggerating this excitation. It may be considered a rule, that if, from experience, we judge that excitation will be long required, blisters must be preferred. But when we require only a transient excitation, as in the cold period of cholera, in the period of concentration of pernicious inter-



mittents, the only remedies indicated are urtication, mustard poultices, the use of heat as a rubefacient, or, in brief, the energetic and transitory agents.

If these acted only as excitants, they would nevertheless find employment in a great variety of circumstances; but they possess in addition important revulsive and spoliative powers, whereby they fulfil a triple indication, which excitants given internally never could. These manifold powers are found also in topical irritants applied to a small surface, with the object of causing a local excitation. The latter can never be produced except by topical means, for it would be an inconvenient thing to arouse the whole system in order to reach a corner of the body, which we should probably rarely reach after all. A few words will explain it.

The fact of inflammation in a region excites a fluxion of blood and an effusion of morbid products into the meshes of the tissue, or upon the surface of membranes. When the inflammation has lasted some time, the local incitability becomes lessened, and the interstitial energy necessary to the digestion and assimilation of morbid products is no longer adequate to such result. In the same way, in a stomach weakened by too exciting a diet, the food cannot be digested unless the excitation be increased; and likewise, in a tissue whose incitability has been used up by excess of irritation, the effused morbid products will not be absorbed unless we stimulate the vital properties of the part. This explains the success of blisters, of issues, of the objective cautery, of the moxa, in indolent tumors; an explanation which would not be completely satisfactory if we did not attend to the transpositive and spoliative actions which occur at the same time.

In this, as in all treatment, excess should be avoided; for, if it be necessary to excite the vital properties, the stimulation must not be pushed so far as to cause too energetic an inflammation; not that this may not sometimes be useful, as a substitutive; but in general the action of the local remedies must be graduated so as to solicit at most a slight inflammation which is directly relieved by antiphlogistics.

END OF VOLUME I.



















